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177
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1. Your reference

P312731/MGO/SCA/JDB

2. Patent application number

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0311403.0

17 MAY 2003

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Scott-Track Limited
68-82 Boden Street
Glasgow
G40 3PX

Patents ADP number (*if you know it*)

If the applicant is a corporate body, give the country/state of its incorporation

United Kingdom

8447161001

4. Title of the invention

"Turnout/Crossover Section for Railway Track"

5. Name of your agent (*if you have one*)

Murgitroyd & Company

"Address for service" in the United Kingdom to which all correspondence should be sent (*including the postcode*)

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Patents ADP number (*if you know it*)

1198015

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (*if you know it*) the or each application number

Country

Priority application number
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Date of filing
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7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
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8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (*Answer 'Yes' if:*

Yes

- a) any applicant named in part 3 is not an inventor, or
 - b) there is an inventor who is not named as an applicant, or
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Continuation sheets of this form

Description 34

Claim(s)

Abstract

Drawing(s) 34

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Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for preliminary examination and search (Patents Form 9/77)

Request for substantive examination (Patents Form 10/77)

Any other documents (please specify)

11.

I/We request the grant of a patent on the basis of this application.

Signature *Murgitroyd & Co*
Murgitroyd & Company

Date 16 May 2003

12. Name and daytime telephone number of person to contact in the United Kingdom

James D Brown

01224 706616

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1 "Turnout/Crossover Section for Railway Track"

2

3 The present invention relates to a turnout or
4 crossover section of railway track and particularly
5 but not exclusively relates to providing a temporary
6 non-intrusive turnout or crossover section of a
7 railway track.

8

9 Railway track requires to be maintained at regular
10 intervals and in order to do this, the section of
11 track that is being maintained must be cleared of
12 trains. The track is normally closed to traffic
13 often during no train periods and also out-with such
14 periods thus causing train cancellations or trains
15 are diverted to other routes for short or longer
16 terms (blockades). In some instances, the trains
17 are transferred from the track having the
18 maintenance performed on it onto an adjacent track
19 for a limited period (i.e. a few hours) and then
20 back onto the original track. The trains are
21 transferred onto the adjacent track by means of a
22 crossover section of track and returned by means of

1 a second crossover. This is known in the art as
2 "Single Line Working" (SLW). Conventionally, each
3 of the crossover sections are intrusive, in that the
4 section of track at which the crossover section is
5 inserted must be cut; this involves cutting the
6 existing rails of each railway track twice and
7 installing the temporary crossover and also
8 installing the switchgear along with providing an
9 interface for signalling. However, such an
10 intrusive crossover section is relatively expensive
11 and requires a fairly long time to plan and to
12 install, where the planning stage alone may take in
13 the region of 2 years. The only other known
14 alternative to solve this problem is to allow the
15 trains to crossover at the nearest permanent
16 crossover sections before and after the maintenance
17 site but these may be many miles away and thus if
18 repair or maintenance is required on only a few
19 metres of track, trains may be forced to share one
20 line of track for both directions (i.e. SLW) for
21 many miles or may be extensively diverted onto
22 alternative routes, thus leading to inefficiency and
23 delays.

24
25 Those in the rail industry will also realise that
26 there is a conflict between passengers who require
27 train services during the daytime and freight trains
28 which operate during the night and thus there is
29 very little time to effect such repairs and
30 maintenance. The overriding difficulty is access to
31 the track for cost efficient maintenance.
32

1 It will be understood by those skilled in the art
2 that a crossover comprises two individual turnouts,
3 where a turnout can be used on its own or can be
4 combined with another turnout to form a crossover.
5

6 In the context of this application, it should be
7 noted that a non-intrusive crossover is one that
8 does not pass through the rail to be crossed but
9 instead crosses over the rail to be crossed.
10

11 According to a first aspect of the present invention
12 there is provided a turnout for a railway track, the
13 turnout comprising a raised track surface which is
14 adapted to provide a path along which the wheels of
15 a train can travel from one railway track to
16 another, wherein the raised track surface is of a
17 sufficient height such that the wheels of the train
18 are arranged to clear the said railway tracks.
19

20 According to a first aspect of the present invention
21 there is also provided a method of transferring a
22 train from one railway track to a second railway
23 track, the method comprising the steps of:-

24 providing a raised track surface which is
25 adapted to provide a path along which wheels of the
26 train can travel from the first to the second
27 railway track;

28 driving the train along the first track and
29 onto the raised track surface, wherein the raised
30 track surface is of a sufficient height such that
31 the wheels of the train are arranged to clear at

1 least one (and preferably both) of the first and
2 second railway tracks.

3

4 The invention has the advantage that it permits
5 short length Single Line Working.

6 Preferably, a crossover comprises a pair of said
7 turnouts.

8

9 According to a second aspect of the present
10 invention, there is provided a system for
11 facilitating Single Line Working on a second railway
12 track to clear a first railway track for maintenance
13 or other purposes, the system comprising a first and
14 a second non-intrusive crossover being spaced apart
15 from the first non-intrusive crossover in the
16 direction of the longitudinal axis of the pair of
17 railway tracks, in order to provide a path along
18 which wheels of a train can travel from the first to
19 the second railway track and from the second to the
20 first railway track.

21

22 According to a second aspect of the present
23 invention there is also provided a method which
24 enables Single Line Working on a second railway
25 track to clear a first railway track for maintenance
26 by other purposes, the method comprising the steps
27 of:-

28 providing a first non-intrusive crossover;
29 providing a second non-intrusive crossover at a
30 location which is spaced apart from the first non-
31 intrusive crossover in the direction of the
32 longitudinal axis of the pair of railway tracks;

1 - passing the train along the first non-intrusive
2 crossover;

3 passing the train along the portion of the
4 second railway track between the first and second
5 non-intrusive crossover;

6 passing the train along the second non-
7 intrusive crossover, such that the train is now
8 returned to a location on the first railway track
9 which is spaced apart in the longitudinal direction
10 from the first non-intrusive crossover.

11
12 Typically, the first and/or second non-intrusive
13 crossover comprise a raised track surface, and
14 preferably the raised track surface is provided with
15 a supporting means to allow for passage of trains.

16
17 Typically, each of the first and second non-
18 intrusive crossovers comprise a pair of turnouts,
19 and preferably each pair of turnouts comprise a pair
20 of rails.

21
22 Typically, each rail of the turnout further
23 comprises a ramp surface, wherein, the ramp surface
24 is preferably tapered from a short or no height end
25 to a relatively tall height end. Most preferably,
26 the ramp surface comprises a linear taper from the
27 short or no height end to the relatively tall height
28 end, and preferably the relatively tall height end
29 is of the same height as that of the raised track
30 surface. Typically, the relatively tall height end
31 of the ramp surface is adjacent to an end of the
32 raised track surface, the two combining to provide a

1 path along which the wheel is permitted to travel
2 whilst maintaining a substantially equal distance
3 between a pair of raised rails, which combined, form
4 the raised track surface. Preferably, the ramp
5 surface comprises a ramp for each rail, where both
6 ramps preferably incline simultaneously, typically
7 avoiding differential levels, in relation to the
8 respective rails.

9
10 In a first embodiment, at least a portion of each
11 rail of the raised track surface may comprise a slot
12 formed therein, typically below a rail head portion,
13 wherein the slot may be arranged to lie over or
14 around the rail being crossed and the rail head
15 portion is releasably fixed to the said rail being
16 crossed.

17
18 In a second, and preferred embodiment, at least a
19 portion of each rail of the raised track surface,
20 which typically forms part of a crossing rail, or a
21 switch rail comprises a railhead portion arranged to
22 lie over or around a supporting member which in turn
23 is preferably arranged to lie over or around the
24 rail being crossed. Preferably, the supporting
25 member is arranged with its longitudinal axis being
26 parallel to the rails of the parent rail.
27 Preferably, the supporting member comprises at least
28 an upper supporting member and at least a lower
29 supporting member. Preferably, the upper supporting
30 member is planar and more preferably, the upper
31 surface of the upper supporting member is attached

1 to at least a portion of the lower surface of the
2 raised track.

3 Preferably, at least another portion of the raised
4 track surface, which is typically the ramp surface,
5 is supported by the parent rail and a fixing means.
6

7 Typically, the upper supporting planar member is
8 substantially wider than an existing rail of one of
9 the first and second railway tracks.
10

11 Preferably, the upper supporting planar member is
12 rectangular in shape, and more preferably, is in the
13 form of a plate.
14

15 Preferably, a pair of guide means are provided along
16 at least a portion of the upper supporting member's
17 length. Preferably the guide means run parallel to
18 the upper supporting member's longitudinal axis, and
19 more preferably, project downwardly in order, in
20 use, to straddle an existing rail of the first and
21 second existing railway tracks.
22

23 Preferably, a pair of lower supporting members are
24 provided at either side of at least a portion of the
25 existing rail.
26

27 Preferably, the pair of lower supporting members
28 combine to provide a substantially similar shape,
29 width and position along the existing railway track
30 as the upper supporting member, and are adapted to
31 be releasably engaged thereto and more preferably,
32 releasably fixed thereto, wherein the lower surface

1 of the upper supporting planar member preferably
2 lies on top of the uppermost surface of the lower
3 supporting members.

4
5 Alternatively, the lower supporting members combine
6 to be longer and/or wider than the upper supporting
7 member.

8
9 Preferably, normal running of a train along the
10 first and/or second existing railway track(s) may be
11 allowed, where the train does not travel between the
12 first and second existing railway tracks by removing
13 one or more sections of the crossover from
14 engagement with the first and/or second existing
15 railway tracks. Preferably, the one or more
16 removable sections comprise at least a ramp, a first
17 portion of the raised track surface, at least an
18 upper supporting member, and leaving in place a
19 second portion of the raised track surface, and at
20 least a lower supporting member.

21
22 Typically, at least a portion of the raised track
23 surface, which is preferably the same portion as
24 before, is formed on top of a rail head portion or
25 more particularly when referring to the crossing
26 rail, a raised crossover member, wherein the height
27 of the raised crossover member at least equals, and
28 is preferably greater than, the depth of a flange
29 portion of the wheel of the train.

30
31 Typically, the raised track surface comprises a
32 plurality of rail members, one or more of which

1 comprise a curved radius away from one of the
2 railway tracks towards the other railway track.
3

4 Preferably, the plurality of rail members combine to
5 form a turnout having a substantially continuous
6 rail surface and includes the following components:-

7 a ramp member adapted to raise the train wheel
8 to the raised height;

9 a curved radius rail adapted to urge the train
10 away from one of the railway tracks towards the
11 other railway track;

12 a substantially straight rail adapted to
13 transfer the train from the curved radius rail of
14 one track toward the other track; and

15 a crossover rail adapted to allow the train to
16 pass over the inner rails of the first and second
17 existing railway tracks at the raised height.
18

19 Typically, at least a portion of the raised track
20 surface, such as the substantially straight rail, is
21 supported in the lateral and or vertical direction
22 at a plurality of locations along its length by a
23 support device. Preferably, the support device
24 comprises a plurality of pot sleeper arrangements.
25

26 Preferably, the one or more turnouts are temporary
27 turnouts and more preferably are non-intrusive
28 turnouts.
29

30 According to a third aspect of the present
31 invention, there is provided a pot sleeper for

1 supporting a rail of a railway track, the pot
2 sleeper comprising:-

3 a body having an, in use, substantially planar
4 upper surface onto which rails may be connected;
5 front and rear faces which extend downwardly at
6 an angle to the upper surface, the faces having
7 lower contact edges for contact with the ground; and
8 a pair of side ends which extend downwardly at
9 an angle to the upper surface for a greater distance
10 than the front and rear faces.
11

12 The invention of the third aspect has the advantage
13 that the pair of side ends project, in use, into the
14 ground thereby providing resistance against lateral
15 (side to side) movement of the pot sleeper, whilst
16 the main weight of the pot sleeper, rail and train
17 is borne by the contact edges and/or the underside
18 of the substantially planar upper surface.
19

20 Preferably, said lower contact edges having a
21 greater surface area than the cross-sectional area
22 of the front and rear sides.
23

24 Preferably, the front and rear faces combine with
25 the upper surface to form an inverted 'U' shaped
26 body, whilst the pair of side ends combine to close
27 the longitudinal axis of the 'U' shaped body.
28 Preferably, the body is hollow, where the hollow
29 body may be partially or wholly filled with a
30 filling material and more preferably, the contact
31 edges are formed by lips which project either
32 inwardly or outwardly from the body (preferably

1 outwardly) to provide a greater surface area to the
2 body on the, in use, horizontal plane.

3
4 Typically, the upper surface is provided with a
5 coupling mechanism to permit coupling of the pot
6 sleeper to a rail. Preferably, a connection
7 mechanism is provided to couple a first to a second
8 respective pot sleeper, where the connection
9 mechanism may include a substantially rigid member
10 which extends therebetween. Typically, the
11 substantially rigid member may be arranged to pass
12 underneath the rails of the existing railway track.

13
14 Preferably, the pot sleepers are driven into ground
15 ballast by a mechanical means which may be a
16 vibrating mechanism means. Typically, further
17 ballast or other material may be inserted into the
18 hollow body to maintain/increase the height of the
19 pot sleeper, in use.

20
21 Embodiments of the present invention will now be
22 described, by way of example only, with reference to
23 the accompanying drawings, in which:-

24
25 Fig. 1 is a plan view of a first embodiment of
26 a temporary non-intrusive turnout in accordance
27 with the present invention;

28 Fig. 2 is a plan view of a portion of the
29 turnout of Fig. 1 highlighted as detail 1;
30 Fig. 3a is a cross-sectional view across
31 section B-B of Fig. 2;

1 Fig. 3b is a side view of a portion of the
2 turnout shown in the direction of A-A of Fig.
3 2;
4 Fig. 4 is a close up view of a G-clamp
5 indicated in Fig. 6 as detail 2;
6 Fig. 5 is a close up view of a G-clamp of Fig.
7 7a indicated as detail 3;
8 Fig. 6 is a cross-sectional view across section
9 C-C of Fig. 1;
10 Fig. 7a is a cross-sectional view across
11 section D-D of Fig. 1;
12 Fig. 7b is a side view of the portion of the
13 turnout shown in Fig. 7a;
14 Fig. 8 is a cross-sectional view across section
15 E-E of Fig. 1;
16 Fig. 9a is a close up plan view of the portion
17 of the turnout indicated in Fig. 1 as detail 4;
18 Fig. 9b is a cross-sectional view across
19 section F-F of Fig. 9a;
20 Fig. 10 is a perspective view photograph of a
21 scale model of a temporary non-intrusive
22 turnout, substantially identical to the
23 embodiment shown in Fig. 1 in accordance with
24 the present invention during installation;
25 Fig. 11 is a perspective view photograph of the
26 turnout section of Fig. 10 further on during
27 construction;
28 Fig. 12 is a perspective view photograph of the
29 turnout section of Fig. 11 further on during
30 construction;

1 Fig. 13 is a perspective view photograph of the
2 turnout section of Fig. 12 further on during
3 construction;
4 Fig. 14 is a plan view photograph of one end of
5 the turnout section of Fig. 13;
6 Fig. 15 is a perspective view photograph of a
7 model representing a train as it enters the
8 turnout section of Fig. 14;
9 Fig. 16 is a perspective view photograph of the
10 model of Fig. 15 as it progresses through the
11 turnout section;
12 Fig. 17 is a perspective view photograph of the
13 model of Fig. 16 as it progresses further
14 through the turnout section;
15 Fig. 18 is a perspective view photograph of the
16 model of Fig. 17 as it nears the end of the
17 turnout section;
18 Fig. 19A is a plan view of an alternative and
19 preferred embodiment of a switch rail to that
20 shown in Fig. 1;
21 Fig. 19B is a cross-sectional view of the
22 switch rail of Fig. 19A;
23 Fig. 20A is a plan view of an alternative
24 embodiment of crossing rail to that shown in
25 Fig. 1;
26 Fig. 20B is a cross-sectional view of the
27 crossing rail of Fig. 20A;
28 Fig. 21A is a plan view of the crossing rail of
29 Fig. 20A;
30 Fig. 21B is a cross-sectional view of the
31 crossing rail taken through the line A-A of
32 Fig. 21A;

1 Figs. 22A, B, C and D are side views of
2 possible/optional gutt rail deflecting means

3 for use with a gutt rail of the turnout of Fig.
4 1;

5 Fig. 23A is a plan view of level crossing
6 support members for supporting the switch rail
7 of Fig. 19A;

8 Fig. 23B is a cross-sectional view of level
9 crossing support members of Fig. 23A;

10 Fig. 23C is a plan view of level crossing
11 support members which is an alternative
12 embodiment for supporting the crossing rails of
13 the turnout of Fig. 1;

14 Fig. 23D is a cross-sectional view of the level
15 crossing support members and the crossing rail
16 of Fig. 23C;

17 Fig. 24A is a perspective view photograph of a
18 further alternative and preferred embodiment of
19 a turnout in accordance with the present
20 invention;

21 Fig. 24B is a plan view photograph of the
22 switch rail and ramp rails and associated level
23 crossing support members of the turnout of Fig.
24 24A;

25 Fig. 24C is a perspective view photograph of
26 the temporary turnout of Fig. 24A , also
27 showing an arrangement of pot sleepers in
28 accordance with a third aspect of the present
29 invention;

30 Fig. 25A is a side view photograph of the ramp
31 rails leading onto the switch rails of the
32 turnout of Fig. 24A;

1 Fig. 25B is side view photograph showing one of
2 the train wheels mid-way up the ramp rail of
3 Fig. 25A;
4 Fig. 26 is a perspective view photograph
5 showing the ramp rail and clamping mechanism;
6 Figs. 27A and 28A are perspective view
7 photographs showing the crossing rail of Fig.
8 24A during installation;
9 Figs. 29A, B, C, D are end view photographs
10 showing the train wheels passing a portion of
11 the support members of Fig. 24B during normal
12 running;
13 Fig. 29E and 29F show the support members and
14 gutt rails of Fig. 29A in position during
15 normal running;
16 Fig. 29G is a perspective view photograph
17 showing the support members of Fig. 29A prior
18 to installation;
19 Fig. 30 is a perspective view photograph
20 showing the train passing over the crossing
21 rails of Fig. 29A, whilst clearing the main
22 tracks;
23 Fig. 31A and B are perspective view photographs
24 taken during installation of the ramp rails and
25 switch rails of Fig. 29A;
26 Fig. 32A is a plan view showing the layout of
27 the pot sleepers of Fig. 24C;
28 Fig. 32B is a plane view showing two pot
29 sleeper arrangements of Fig. 24C connected by
30 a rigid frame;
31 Fig. 32C shows an end, side, and plan view of
32 the pot sleeper arrangement of Fig. 24C;

1 Fig. 33A is a perspective view photograph
2 showing the pot sleeper and rigid frame
3 arrangements of Fig. 32B in their operational
4 position;
5 Fig. 33B is a perspective view photograph of
6 the pot sleeper arrangement of Fig. 24C with a
7 sample rail section fixed thereto;
8 Fig. 34A is side view photograph of the pot
9 sleeper arrangement of Fig. 24C with a sample
10 rail section fixed thereto;
11 Fig. 34B is a perspective view photograph
12 showing the pot sleeper arrangement and switch
13 rail of Fig. 24C in their operational
14 positions;
15 Fig. 35A and B are perspective view photographs
16 showing the layout of the pot sleeper
17 arrangements of Fig. 24C.

18
19 Fig. 1 shows a non-intrusive turnout generally
20 indicated as 10 in accordance with a first
21 embodiment of the present invention. It will be
22 appreciated by the reader that two spaced apart non-
23 intrusive turnouts 10 are utilised on a section of
24 track to provide a non-intrusive crossover.

25
26 As shown in Fig. 1, the temporary non-intrusive
27 turnout 10 links a south bound rail track 12 and a
28 north bound rail track 14, such that a train (not
29 shown) which has already been transferred from the
30 south bound rail track 12 to travel south along the
31 north bound rail track 14 can be transferred back
32 onto the south bound rail track 12. In this manner,

1 the portion of the south bound rail track 12' can be
2 repaired/maintained. The skilled reader will
3 realise that other routes of transfer could be
4 installed and adopted.

5

6 The temporary non-intrusive turnout 10 comprises a
7 number of components which will now be described.

8

9 The non-intrusive turnout 10 comprises a pair of
10 turnout tracks 16, 18 and a plurality of temporary
11 sleepers 20. For ease of reference, the turnout
12 track 16 will be referred to as the left hand
13 turnout track 16 and the turnout track 18 will be
14 referred to as the right hand turnout track 18.

15

16 The left hand turnout track 16 comprises, from the
17 left hand end of Fig. 1, a ramp rail 22L. The
18 uppermost portion of the ramp rail 22L is wedge
19 shaped, with the uppermost surface tapering linearly
20 from its left most end which has a height of 0mm up
21 to its right most end which has a height of
22 approximately 50mm and this linear tapering can be
23 best seen in Figs. 7B, 25A and 25B which shows that
24 the ramp rail 22 has a sufficient length, in the
25 region of 1700mm, such that the angle of tapering is
26 relatively gradual. The ramp rail 22L is coupled to
27 the north bound left hand rail track 14L by means of
28 a G-clamp mechanism 32 as shown in Fig. 5; it should
29 be noted however that other types of clamp
30 mechanisms could be utilised. The ramp rail 22
31 comprises a head portion 51 which rests on top of
32 the upper flat surface of the rail track 12, 14. A

1 neck portion 53 extends downwardly from the inner
2 most edge of the head portion 51, where the neck
3 portion 53 is shaped to substantially match the
4 shape of the inside face of the rail track 12, 14.

5
6 The G-clamp mechanism 32 comprises a G-shaped clamp
7 34, one end of which surrounds and is compressed
8 against, the opposite upstanding face of the rail
9 track 12, 14 to the neck portion 53. A vice 36
10 extends toward the neck portion 53 of the ramp rail
11 22 from the other end of the G-shaped clamp 34, such
12 that the vice 36 can be forced or urged into secure
13 connection with the neck portion 53. Preferably,
14 the vice 36 is of a type that can be readily
15 assembled and disassembled in a short amount of
16 time.

17
18 Following on from the ramp rail 22L from left to
19 right, the left hand turnout track 16 next comprises
20 a switch rail 24L, the left hand most end of which
21 is arranged to butt against the right hand most end
22 of the ramp rail 22L, as shown in Fig. 7b. As shown
23 in Fig. 6, the switch rail 24L, 24R comprises a
24 respective head portion 55L, 55R and the switch rail
25 24L, 24R is inwardly curved along its length, toward
26 the south bound rail track 12 and thus away from the
27 north bound rail track 14. In other words, the end
28 of the switch rail 24L adjacent to the ramp rail 22L
29 is located directly above the north bound rail track
30 14L whilst the opposite end of the switch rail 24L
31 is displaced from the north bound rail track 14L.
32 Nevertheless, the head portion 55L comprises a

1 linear height of approximately 50mm arranged
2 horizontally along its length. The switch rail 24L
3 also comprises a neck portion 57L. Conveniently,
4 and as shown in Fig. 4, the neck portion 57L may
5 have a slot formed in it at the end of the switch
6 rail 24L closest to the ramp rail 22L, such that the
7 upper most portion of the north bound rail track 14L
8 can protrude inwardly through said slot.

9 Alternatively, the slot may be omitted, with the
10 neck portion 57L following the shape of the inside
11 face of the north bound rail track 14L. The switch
12 rail 24L is secured in a releasable fashion to the
13 north bound rail track 14L by means of a G-clamp
14 mechanism 62 which operates in a similar fashion to
15 the G-clamp mechanism 32 of Fig. 5. The G-clamp
16 mechanism 62 as shown in Fig. 4 comprises a similar
17 G-shaped clamp 64 and a vice 66. The switch rail
18 24L is supported at its middle and right hand most
19 end from underneath by the G-clamp mechanism 62 and
20 temporary sleepers 20. It should be noted that the
21 term "inside face" is used in the sense that it is
22 the face that the respective turnout track 16, 18 is
23 being turned away from.

24
25 Following on from the switch rail 24L from left to
26 right, the left hand turnout track 16 next comprises
27 a gutt rail 26L. The gutt rail 26L has an I-shaped
28 cross-section which is broadly similar to the I-
29 shaped cross-section of a normal rail track such as
30 12, 14. The gutt rail 26L continues to bend at
31 approximately the same radius as the bend radius of
32 the switch rail 24L. The clamping mechanism of the

1 gutt rail 26L to the north bound rail track 14L is
2 similar to that as shown in Fig. 8 which will be
3 described subsequently. Again, the gutt rail 26L is
4 supported from underneath by the clamping mechanism
5 and temporary sleepers 20 to have its upper flat
6 horizontal surface to be approximately 50mm above
7 the south bound 12 and hence north bound 14 rail
8 tracks.

9
10 Up until this point, the right hand turnout track 18
11 substantially mirrors that of the left hand turnout
12 track 16, since the right hand turnout track 18
13 comprises, from left to right in Fig. 1, a ramp rail
14 22R, a switch rail 24R and a gutt rail 26R.

15
16 The left hand turnout track 16 from left to right
17 after the gutt rail 26L comprises a straight rail
18 28L which thus has no bend radius and which once
19 again is supported by the temporary sleepers 20 to
20 have its upper flat horizontal surface to be
21 approximately 50mm above the south bound 12 and
22 hence north bound 14 rail tracks.

23
24 Following immediately on from the straight rail 28L,
25 the left hand turnout track 16 comprises a crossing
26 rail 30L which is broadly similar to the crossing
27 rail 30R which will be described subsequently.

28
29 Immediately following on from the gutt rail 26R, the
30 right hand turnout track 18 comprises a crossing
31 rail 30R which is shown in more detail in Fig. 2 and
32 Figs. 3A and 3B. The crossing rail 30R comprises a

1 substantially I-shaped cross-section toward and at
2 both its ends which is substantially the same I-
3 shaped cross-section as the existing south bound 12
4 and north bound 14 rail track. Thus, towards and at
5 its ends, the crossing rail 30R comprises a head
6 portion 59 and a neck portion 61. However, a slot
7 or gap 31 is provided along a portion of the length
8 of the crossing rail 30R about the mid point of the
9 crossing rail 30R such that there is no neck portion
10 61 in the region of the slot 31 as shown most
11 clearly in Fig. 3B. The crossing rail 30R is
12 arranged to lie across the north bound rail track
13 14L such that the north bound rail track 14L lies
14 within the slot 31. Accordingly, since the crossing
15 rail 30R is again supported from underneath by the
16 temporary sleepers 20 to have its head portion 59
17 with a height of approximately 50mm and since the
18 crossing rail 30R is arranged to be horizontal, the
19 upper most surface of the crossing rail 30R is
20 approximately 50mm higher than the upper most
21 surface of the south bound 12 and north bound 14
22 rail tracks.

23
24 The right hand turnout track 18 next comprises from
25 left to right and immediately after the crossing
26 rail 30R, a straight rail 28R which is substantially
27 identical in function and arrangement to the
28 straight rail 28L previously described. Similarly,
29 the crossing rail 30L is substantially identical to
30 the crossing rail 30R in function and arrangement
31 except that the crossing rail 30L crosses over the
32 south bound rail track 12R.

1

2 The left hand turnout track 16 follows on from left

3 to right after the crossing rail 30L with a gutt.
4 rail 42L which is followed by a switch rail 44L
5 which is in turn followed by a ramp rail 46L which
6 are respectively substantially identical to the gutt
7 rails 26L, switch rail 24L and ramp rail 22L in
8 function and arrangement.

9

10 The right hand turnout track 18 follows on from the
11 straight rail 28R from left to right with a gutt
12 rail 22R which is followed by a switch rail 44R
13 which is in turn followed by a ramp rail 46R which
14 are respectively substantially identical in function
15 and arrangement to the gutt rail 26R, the switch
16 rail 24R and the ramp rail 22R.

17

18 As shown in Fig. 8, the gutt rails 42L, 42R (and
19 thus the gutt rails 26L, 26R) are clamped to the
20 south bound rail tracks 12L, 12R by means of a J
21 block arrangement 68L, 68R and a lengthened G-clamp
22 mechanism 70L, 70R. The J block arrangement 68L and
23 G-clamp mechanism 70L will now be described, but
24 those skilled in the art will realise that the J
25 block arrangement 68R and G-clamp mechanism 70R are
26 substantially identical to the J block arrangement
27 68L and G-clamp mechanism 70L except that they are
28 rotated through 180°. The gutt rail 42L is spaced
29 apart from the south bound rail track 12L by means
30 of the J block arrangement 68L which is preferably
31 formed from any hard material that is shaped to fit
32 into the heart of the rail to maintain a set

1 distance between the rails. As shown in Fig. 8, the
2 J block arrangement 68L is arranged such that it not
3 only spaces the gutt rail 42L horizontally apart
4 from the south bound rail track 12L but it also
5 spaces them vertically apart, such that the upper
6 most horizontally arranged surface of the gutt rail
7 42L is approximately 50mm vertically above the upper
8 most horizontally arranged surface of the south
9 bound rail track 12L. The G-clamp mechanism 70L
10 clamps the gutt rail 42L to the south bound rail
11 track 12L via the J block arrangement 68L and the G-
12 clamp mechanism 70L once again comprises a vice 76L
13 or a bolted fixing through the rail 12L, 42L and J
14 block arrangement 68L or similar arrangement.

15
16 It should be noted that, as shown in Fig. 9A, the
17 left hand 16 and right hand 18 turnout tracks may be
18 provided with a pot sleeper arrangement 80, where
19 the two pot sleeper arrangements 80L, 80R are
20 coupled to one another via a rigid frame 82L, 82R,
21 where the rigid frame 82L, 82R may be provided in
22 two halves, 82L, 82R which are coupled to one
23 another at their outer most ends via a suitable
24 fixing means 84 such as nuts and bolts (not shown).
25 Thus, the pot sleeper arrangement 80L, 80R can be
26 used either to replace the temporary sleepers 20 (as
27 shown in Figs. 32A and 33A) or could be provided on
28 top of an in-situ or existing timber sleeper, in
29 order to provide increased rigidity to the non-
30 intrusive temporary turnout 10.

31

1 The pot sleeper arrangement 80 is shown in more
2 detail in Figs. 33B and 34A with a sample rail
3 section 86 fixed in position. The beam section 84
4 of the pot sleeper 80 has a hollow, inverted U-
5 shaped cross section which is toed out at the
6 lowermost end of each side of the inverted, U-shape
7 to form lips 88. End plates 90 are attached to each
8 end of the beam section 84 such that each end plate
9 90 protrudes vertically downward past the lips 88,
10 the downward projection typically being in the
11 region of 100mm. The sample rail section 86 is
12 connected to the beam section 84 by conventional
13 'Pandrol' clips 92 which are known widely in the
14 railway industry.
15
16 When the pot sleepers 80 are in position, the end
17 plates 90 project into the ballast or stones (not
18 shown in Fig. 33B) until the lips 88 are level with
19 the ballast (not shown). This projection of the
20 plates 90 provides increased lateral stability to
21 the pot sleepers 80 in both the longitudinal and
22 perpendicular directions with respect to the main
23 axis of the pot sleepers 80, whilst keeping the mass
24 of the pot sleeper arrangement 80 to a minimum. The
25 lips 88 also create a larger surface area or
26 footprint for the pot sleeper 80 which avoids it
27 sinking into the ballast (not shown) beyond a
28 satisfactory depth when a load is placed on the pot
29 sleeper 80 (i.e. during the passing of a train 5).
30
31 Fig. 10 shows a scale model of a non-intrusive
32 turnout 10 part way through construction; it should

1 be noted however that the scale model shown in Fig.
2 10 omits the straight rails 28L, 28R and also the
3 switch rails 44L, 44R but it is envisaged that the
4 straight 28L, 28R and switch 44L, 44R rails would be
5 used in a full size rail track 12, 14.

6
7 Fig. 10 shows that a couple of temporary sleepers 20
8 have been laid, and the gutt rails 42L, 42R have
9 been secured to the temporary sleepers 20 and also
10 secured to the south bound track 12L, 12R. It
11 should also be noted that the gutt rails 42R are in
12 essence longer versions of the switch rails 44L, 44R
13 in the model shown in Fig. 10 through Fig. 18. The
14 crossover rail 30L has also been installed such that
15 it crosses over the south bound rail track 12R.

16 Fig. 11 shows that the gutt/switch rail 26L has been
17 installed next and is followed by installation of
18 the gutt/switch rail 26R in Fig. 12 and is followed
19 by the crossover rail 30R as shown in Fig. 13.

20 Thereafter, the ramp rails 22L, 22R are secured to
21 the respective north bound rail tracks 14L, 14R.

22
23 A model of a train 5 is shown in Fig. 15 as having
24 travelled south along the north bound rail track 14
25 and having mounted the ramp rails 22L, 22R. It is
26 important to note that the ramp rails 22L, 22R raise
27 the wheels of the train (not shown) and thus the
28 model train 5 by an amount sufficient such that the
29 flanged part of the wheel is just vertically above
30 the height of the rest of the normal track 14L, 14R.
31 Thus, and as shown in Fig. 16, when the model train
32 5 moves onto the crossing rails 30L, 30R, the left

1 hand 16 and right hand 18 turnout tracks are of a
2 sufficient height such that the flanged part of the
3 wheel 7, which normally acts to keep the model train
4 5 and thus full size trains on the tracks, is able
5 to clear the north bound rail track 14L and then the
6 south bound rail track 12R. The model 5 is shown in
7 Fig. 17 as continuing through the non-intrusive
8 temporary turnout 10 until it reaches the position
9 shown in Fig. 18 which shows the model 5 about to
10 travel down the ramp rails 46L, 46R and then onward
11 as per normal south along the south bound rail track
12 12.

13
14 The embodiment of the non-intrusive turnout 10
15 described herein has the great advantage that the
16 rail tracks 12R and 14L do not require to be cut
17 which would be normal if a conventional intrusive
18 temporary turnout was to be inserted in to the
19 tracks 12, 14. Furthermore, those skilled in the
20 art will appreciate that, if a train requires to
21 pass through the non-intrusive temporary turnout 10
22 without actually crossing over from one track 12
23 onto another track 14, the ramp rails 22 or 46 as
24 required can be removed along with the respective
25 switch rails 24 or 44 and crossing rail 30L or 30R
26 and as such the train will be able to bypass the
27 non-intrusive temporary turnout 10.

28
29 A non-intrusive turnout in accordance with an
30 alternative and preferred embodiment of the present
31 invention will now be described with reference to
32 Figs. 19 to 35.

1

2 The sequence of rail components length wise along
3 the track of the turnout of Figs. 19 to 35 is the
4 same as that for the previous embodiment (Fig. 1)
5 i.e. from the left hand end of the left hand turnout
6 track 16, a pair of ramp rails 21, 22 followed by a
7 pair of switch rails 23, 24 followed by a pair of
8 gutt rails 25, 26, followed by a pair of crossing
9 rails 29, 30 etc.

10

11 The ramp rails 21, 22 and the means of connecting
12 the ramp rails 21, 22 (G-clamp mechanism 32,
13 represented by 32 in Fig. 26) in this embodiment are
14 broadly similar to that of the previous embodiment,
15 and thus require no further description.

16

17 Following on from the ramp rails 21, 22, Figs 19A
18 and B along with Figs. 24A, B , C) shows a pair of
19 switch rail units generally designated 100
20 comprising a switch rail head 50, planar member or
21 plate 38, guide means 60 in the form of downwardly
22 projecting guide flanges 60, a pair of supporting
23 members 40, end plate 72, and support connecting
24 means 48 in the form of clips 48.

25

26 The switch rail head 50 essentially takes the form
27 of an upper portion of an I-shaped rail section
28 (shown during installation of the apparatus in Figs.
29 31A and B), and extends between one end of the
30 switch rail unit 100 and the other. The switch rail
31 head 50 is inwardly curved along its length toward
32 the south bound rail track 12 and thus away from the

1 north bound rail track 14, in a broadly similar
2 manner to the previous embodiment (Fig. 1).

3
4 The planar member or plate 38 is rectangular in
5 dimension and is permanently attached to the switch
6 rail head 50 by any suitable means during
7 manufacture such as welding or moulding etc. The
8 plate 38 may or may not extend along the full length
9 of the switch rail unit 100; in the latter case, the
10 switch rail head 50 will overhang the plate member
11 38. This is best seen in Figs. 27A and 28A.

12
13 The pair of guide flanges 60 project downwardly from
14 the plate 38 and run parallel to the existing north
15 bound track 14 along the entire length of the switch
16 rail unit 100 and are displaced from the centreline
17 or the plate 38 by an amount which allows the inner
18 track of the existing north bound track 14 to fit
19 closely between the pair of guide flanges 60. The
20 skilled reader will realise that the guide flanges
21 60 may only be present at the extreme ends of the
22 plate 38.

23
24 Each supporting member 40 may be a wooden timber and
25 has a cross sectional shape which allows them to be
26 placed underneath the plate 38 and close around the
27 inner and outer neck portions of the existing rail.
28 The lower surface of each supporting member 40
29 together may also be adapted, during manufacture or
30 upon installation, to match the contours of a
31 variety of standard railway sleepers. The pair of
32 supporting members 40 are of a length, width and

1 position, substantially similar to that of the
2 plate 38, though it will be appreciated that longer
3 and or wider supporting members may be preferable
4 depending upon the individual situation parameters,
5 for example the alignment and or size of the gaps
6 between sleepers.

7
8 The clips 48 releasably attach the pair of
9 supporting members 40 to the plate 38, and are
10 designed such that they will hold the supporting
11 members 40 firmly against the planar member 38 in
12 the vertical direction, and against the existing
13 rail in the lateral direction.

14
15 The end plate 72 protrudes vertically downward from
16 the overhang created by the switch rail head 50 and
17 butts against the end of the inner supporting member
18 40.

19
20 It will be appreciated by the reader that in this
21 embodiment the supporting members 40 may be left in
22 position during normal running of the railway track
23 (as shown in Figs. 29A, B, C, D, E and F); that is
24 when no transfer of trains between one railway track
25 and another is required, so that there is no
26 crossover of a train 5 travelling on either north
27 bound track 14 or south bound track 12.

28 Alternatively the supporting members 40 may be
29 placed to one side ready for installation as shown
30 in Fig. 29G. Therefore in this embodiment of the
31 invention the switch rail head 50 and planar member

1 38 may be installed and removed with relative ease
2 and in a relatively short amount of time as desired.

3
4 Following on from the switch rail unit 100 the
5 turnout next comprises a pair of gutt rails 25, 26.
6 The gutt rails 25, 26 in this embodiment are broadly
7 similar to that of the previous embodiment, and thus
8 require no further description.

9
10 Following on from the gutt rails 25, 26, the turnout
11 next comprises a pair of crossing units generally
12 designated 200 (Figs. 20A, B and Fig. 30). Each
13 crossing unit 200 comprising a crossing rail head
14 50c, planar crossing member or plate 38c, guide
15 flanges 60c, a pair of supporting members 40c, a
16 pair of end plates 72c, and support connecting clip
17 48c.

18
19 The crossing rail head 50c has the same cross
20 sectional shape as that of the switch rail 50, (i.e.
21 upper portion of an I-shaped rail section), and
22 extends diagonally between one end of the crossing
23 unit 200 and the other, so as to point toward the
24 south bound track 12 and thus away from the north
25 bound track 14.

26
27 The crossing rail head 50c may span a longer
28 distance along the crossing unit 200 than the
29 crossing plate 38c and the supporting members 40c,
30 thus creating an overhang at either or both ends of
31 the crossing unit 200.

32

1 The crossing plate 38c, guide flanges 60c,
2 supporting members 40c, and support connecting
3 clips 48c are broadly similar to those of the switch
4 rail unit 100, and thus require no further
5 description.

6
7 The pair of end plates 72c protrude vertically
8 downward from the overhang created by the crossing
9 rail head 50c. Each end plate butts against the end
10 of a supporting member 40c.

11
12 The end plates 72 of the switch rail head 50, and
13 the end plates 72c of the crossing rail head 50c may
14 be drilled to suit a standard connecting means such
15 as a fishplate, in order to provide a secure
16 connection between each rail head component.

17
18 The non-intrusive turnout 10 described in this
19 embodiment has an advantage over the previous
20 embodiment of additional support to the turnout
21 track which is provided by the supporting members
22 40, 40c whilst still allowing the switch rail head
23 50, crossing rail 50c, plate 38, and crossing plate
24 38c to be removed and installed relatively easily,
25 without permanent alteration (i.e. cutting) of the
26 existing track.

27
28 Fig. 21A and B show the crossing unit of a non-
29 intrusive turnout in accordance with a further
30 alternative embodiment of the present invention,
31 which will now be described.

32

1 A partially supported crossing unit generally
2 designated 300 comprises a crossing rail head 50d,
3 and a tapered supporting member 40d.

4
5 The crossing rail head 50d is broadly similar to
6 that of the previous embodiments e.g. 50c and thus
7 requires no further description.

8
9 The tapered supporting member 40d is wedge shaped
10 such that it fits in the gap created between the
11 crossing rail 50d and the existing rail near the
12 point of crossing over.

13
14 For each of the previously described embodiments,
15 when the ramp rails 21, 22, switch rails 23, 24, and
16 crossing rails 29, 30 are removed it is preferable
17 that the end of each gutt rail 25, 26 exposed to an
18 oncoming train is provided with deflecting means
19 which deflect any loose items (not shown) suspended
20 below the railway carriage (not shown) away from the
21 gutt rails 25, 26, thereby preventing such items
22 from snagging on the gutt rails 25, 26 which could
23 otherwise result in derailment of the railway
24 carriage. Figs. 21A, B, C and D show possible
25 deflecting means for this purpose. Each deflecting
26 means is adapted to be easily fitted onto the
27 exposed end of the gutt rails 25, 26 by suitable
28 means, for example a fishplate. Prior to re-
29 installation of the ramp rails 21, 22, switch rails
30 23, 24, and crossing rails 29, 30, the deflecting
31 means will be removed.

32

1 Fig. 23A and B show supporting means for a switch
2 rail and crossing unit of a non-intrusive turnout in
3 accordance with a further alternative embodiment of
4 the present invention, which will now be described.

5
6 Central level crossing support members 40e known and
7 used in the industry are wedged between the existing
8 rails and are supported by central supports 78c
9 which are connected to the existing sleeper 79. The
10 central level crossing support members 40e are
11 complimented by outer level crossing support members
12 400e which are supported by outer supports 78o.
13 Positioned between the outer level crossing support
14 members 400e and the inner level crossing support
15 members 40e are outer packing wedges 120 and inner
16 packing wedges 121. The outer and inner packing
17 members 120, 121 secure the level crossing members
18 40e, 400e in both the lateral and vertical
19 directions.

20
21 The switch rail head 50e and planar member 38e are
22 broadly similar to that described previously (Fig.
23 19) and are situated above the level crossing
24 support members 40e and 400e.

25
26 A similar adaptation is shown in Figs. 23C and D
27 making use of the level crossing supports 40e and
28 400e in the crossing rail unit.

29
30 This support arrangement has the advantage over
31 previous embodiments of the invention in that it
32 allows the loads exerted by the passing train to be

1 transferred directly to the sleeper and existing
2 rail, whilst using currently available components.

3
4 It should be noted that embodiments of the present
5 invention offer a number of advantages over previous
6 apparatus for transferring trains from one track to
7 another, namely but not exclusively that, the
8 crossover is non-intrusive, there is no requirement
9 for the train wheel to run on the flange at any
10 point, and that the embodiments do not require a
11 pivotable section to effect the transfer, thereby
12 decreasing the likelihood of malfunction of the
13 apparatus, and that the simultaneous incline of the
14 ramps avoids twisting occurring to the train
15 axles/bogies as they run up the ramps.

16
17 Modifications and improvements may be made to the
18 embodiments described herein without departing from
19 the scope of the invention. For instance, the
20 height of approximately 50mm of the various
21 components of the non-intrusive temporary turnout 10
22 can be varied to suit the flanges provided on the
23 wheels of trains in different countries and may be
24 adapted to accommodate various track gauges. Those
25 skilled in the art will realise that the height of
26 the various components simply needs to be equal to,
27 or more preferably just slightly higher than the
28 extent of the flange provided on the wheels of
29 trains in each particular country.

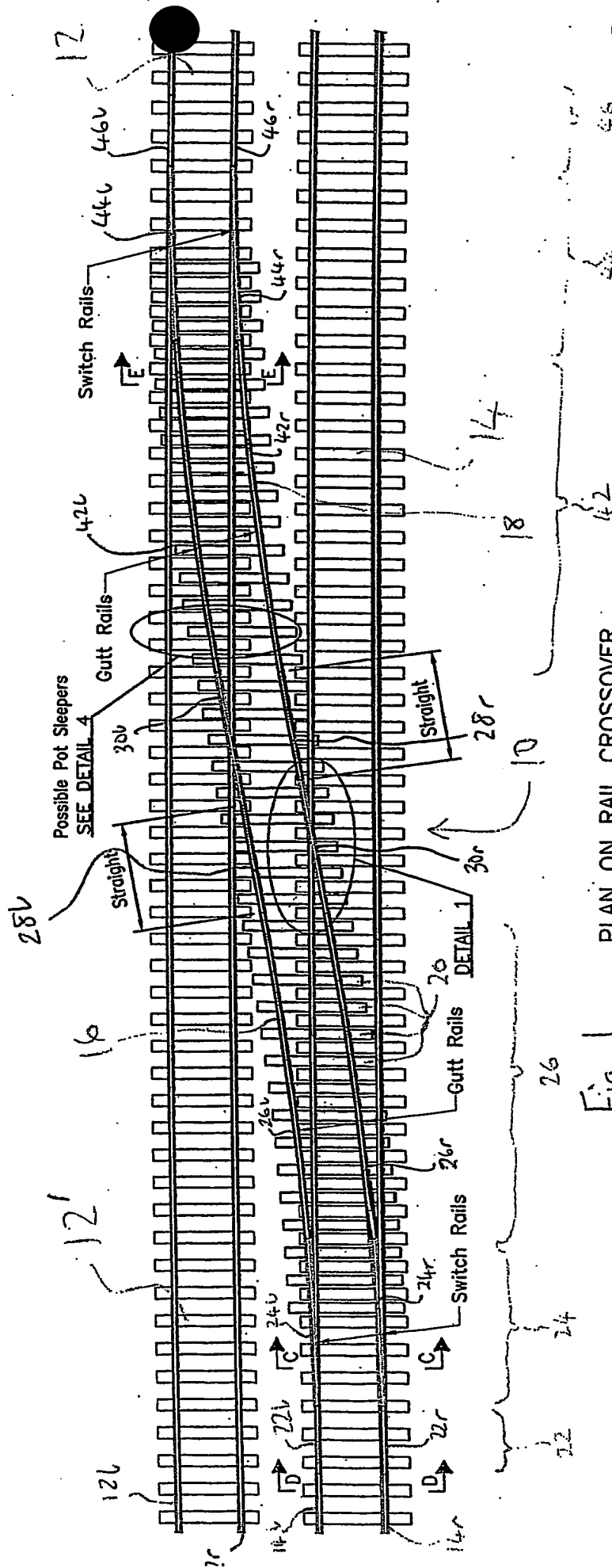


Fig. 1

PLAN ON RAIL CROSSOVER

Scale 1:100

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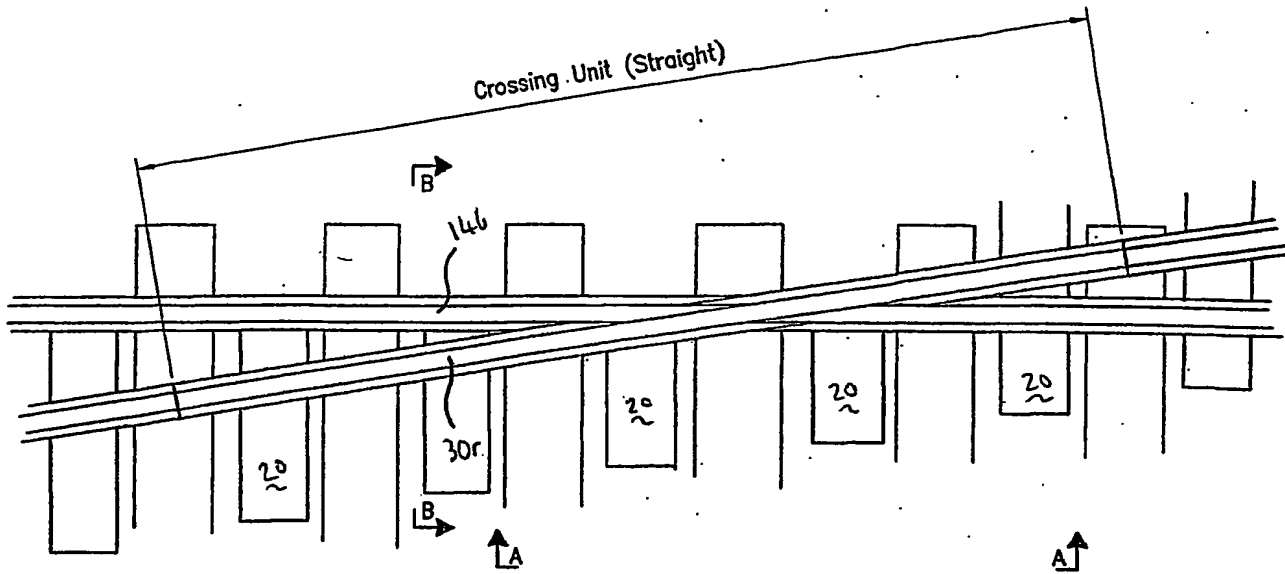
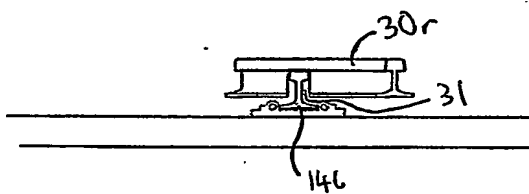


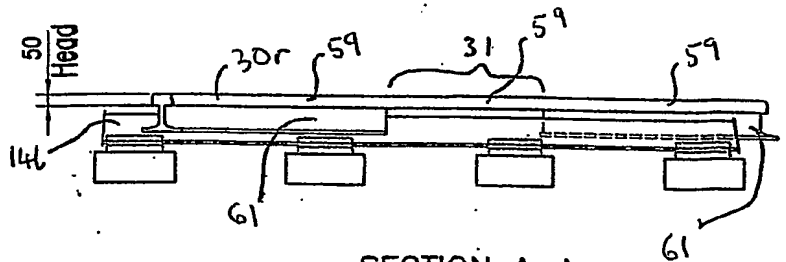
Fig. 2

DETAIL 1
(SIM 2 PLACES)
Scale 1:20



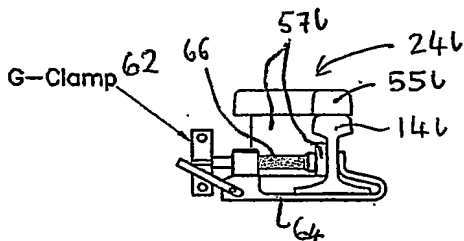
SECTION B-B
Scale 1:20

Fig. 3(a)



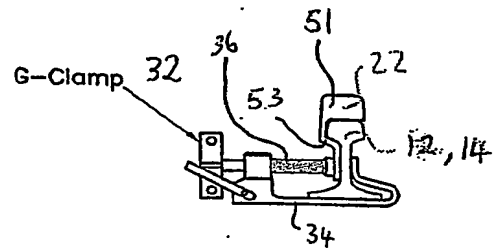
SECTION A-A
Scale 1:20

Fig. 3(b)



DETAIL 2
Scale 1:10

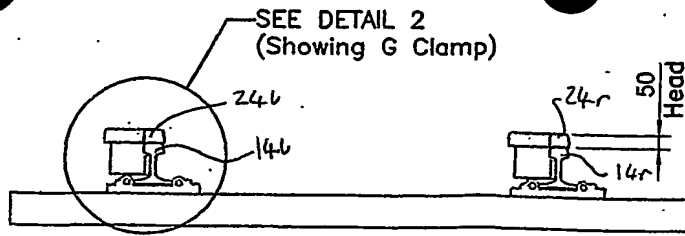
Fig. 4



DETAIL 3
Scale 1:10

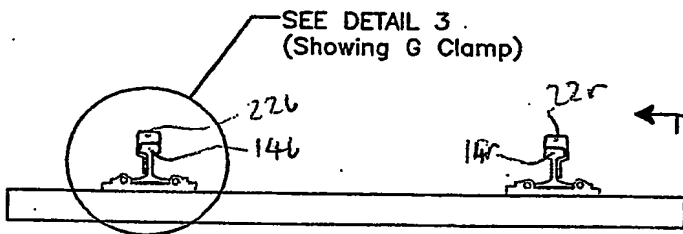
Fig. 5

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SECTION C-C
Scale 1:20

Fig. 6



SECTION D-D
Scale 1:20

Fig. 7(a)

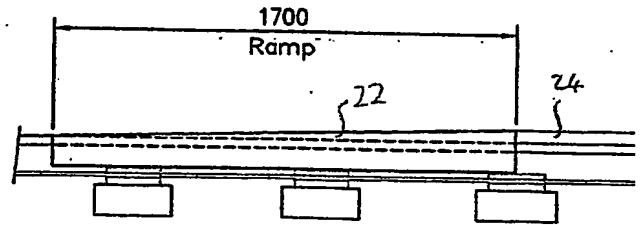
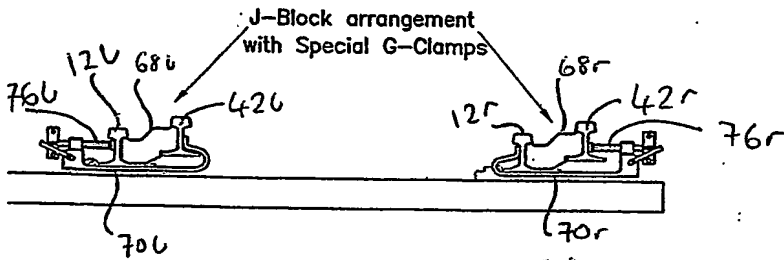


Fig. 7(b)



SECTION E-E
Scale 1:20

Fig. 8

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Fig. 9(a)

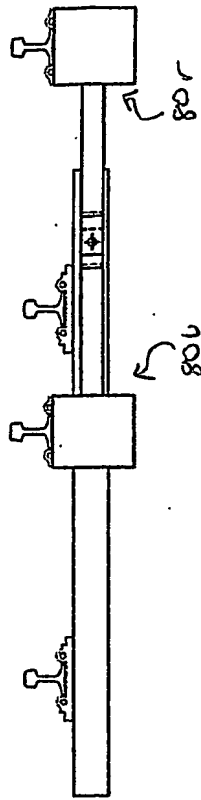
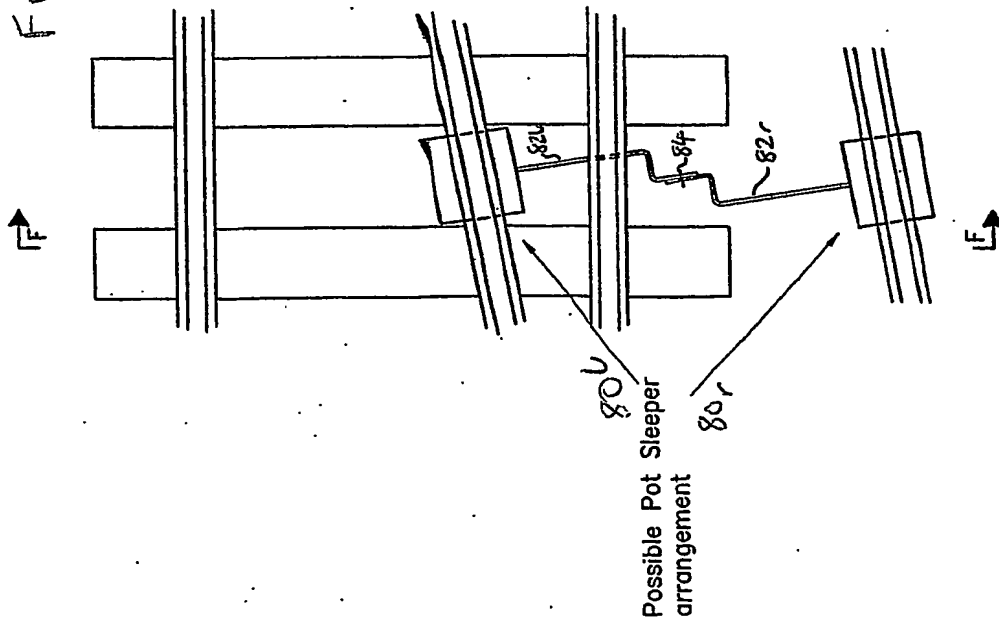


Fig. 9(b)

DETAIL 4
Scale 1:20

5/24

10

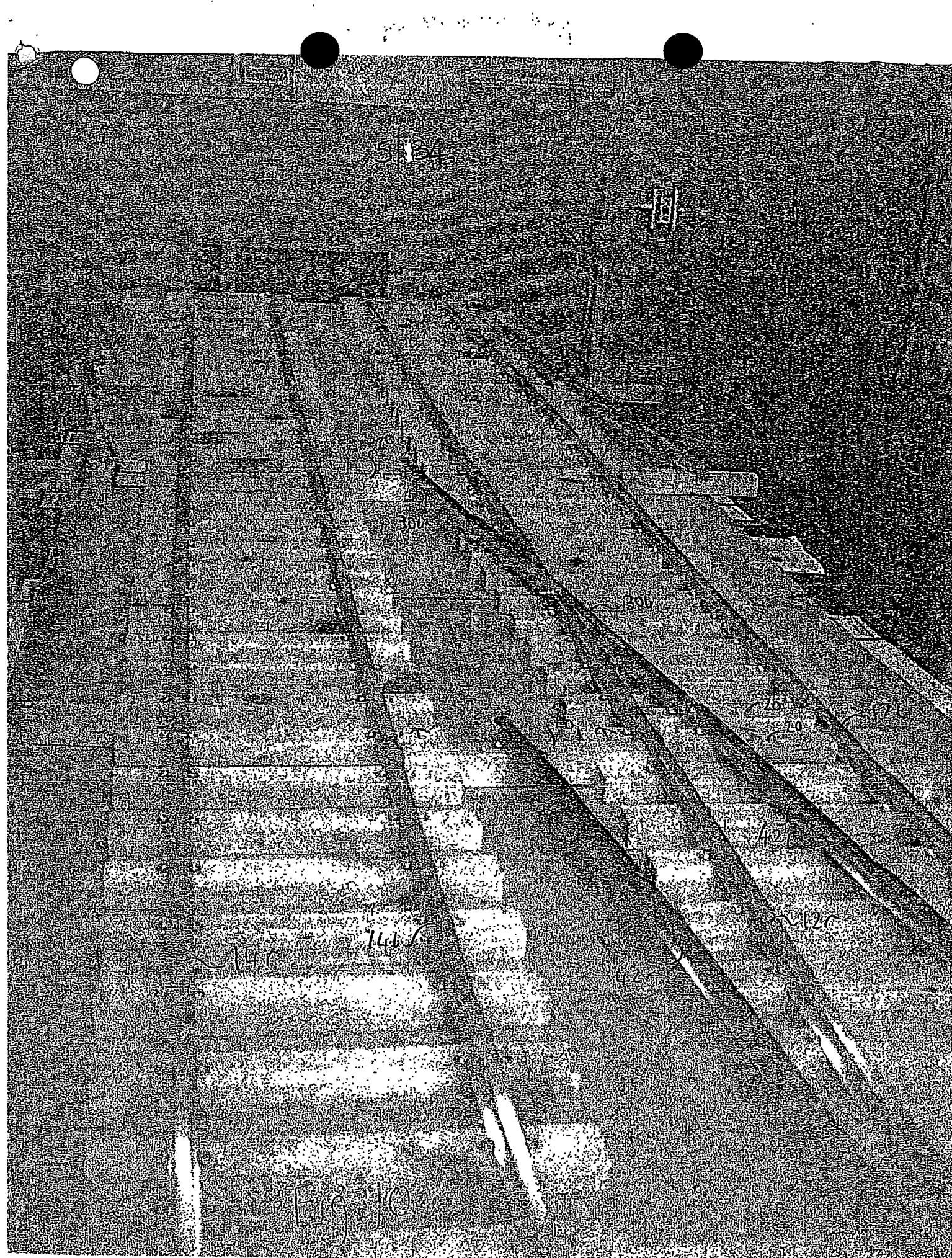
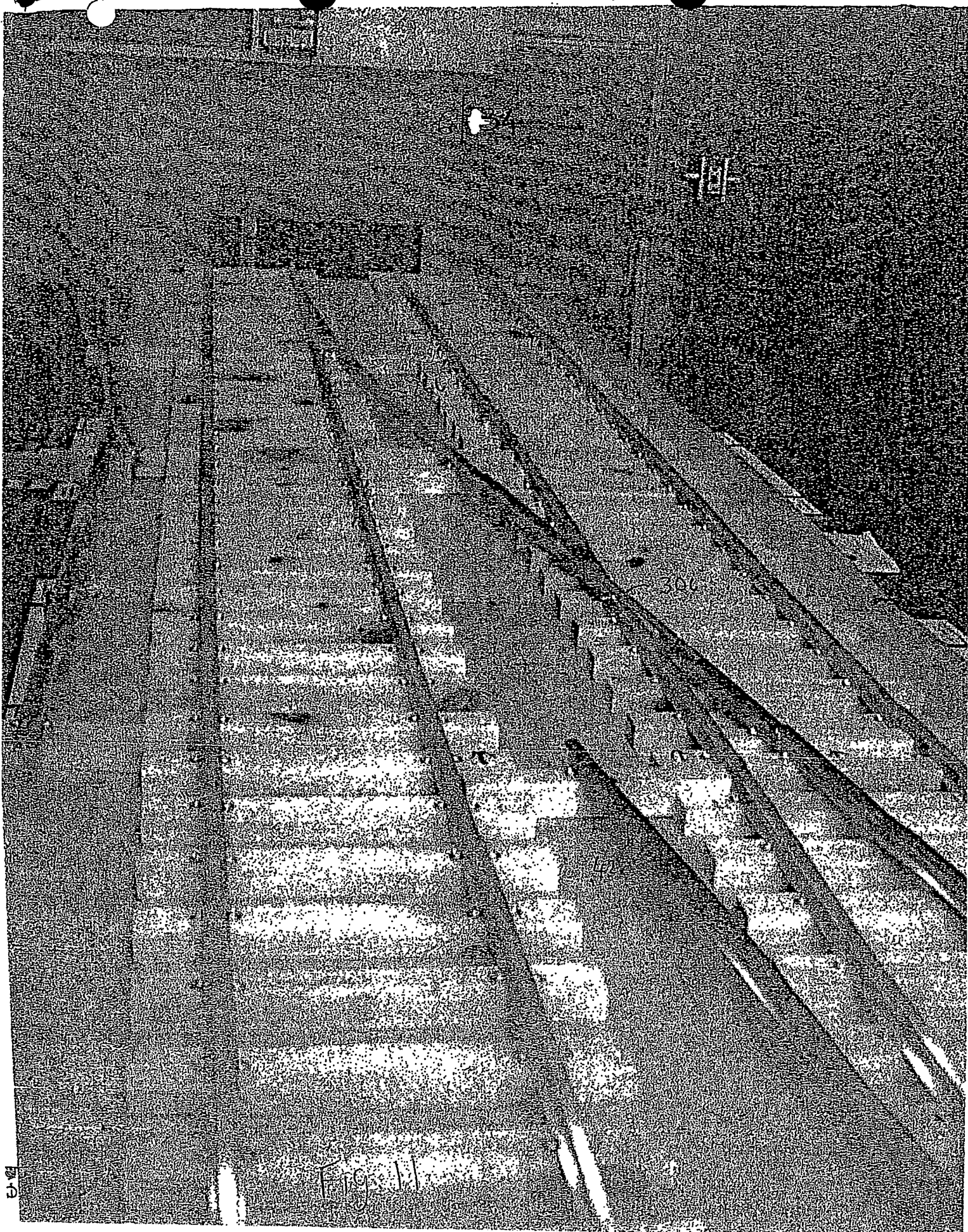
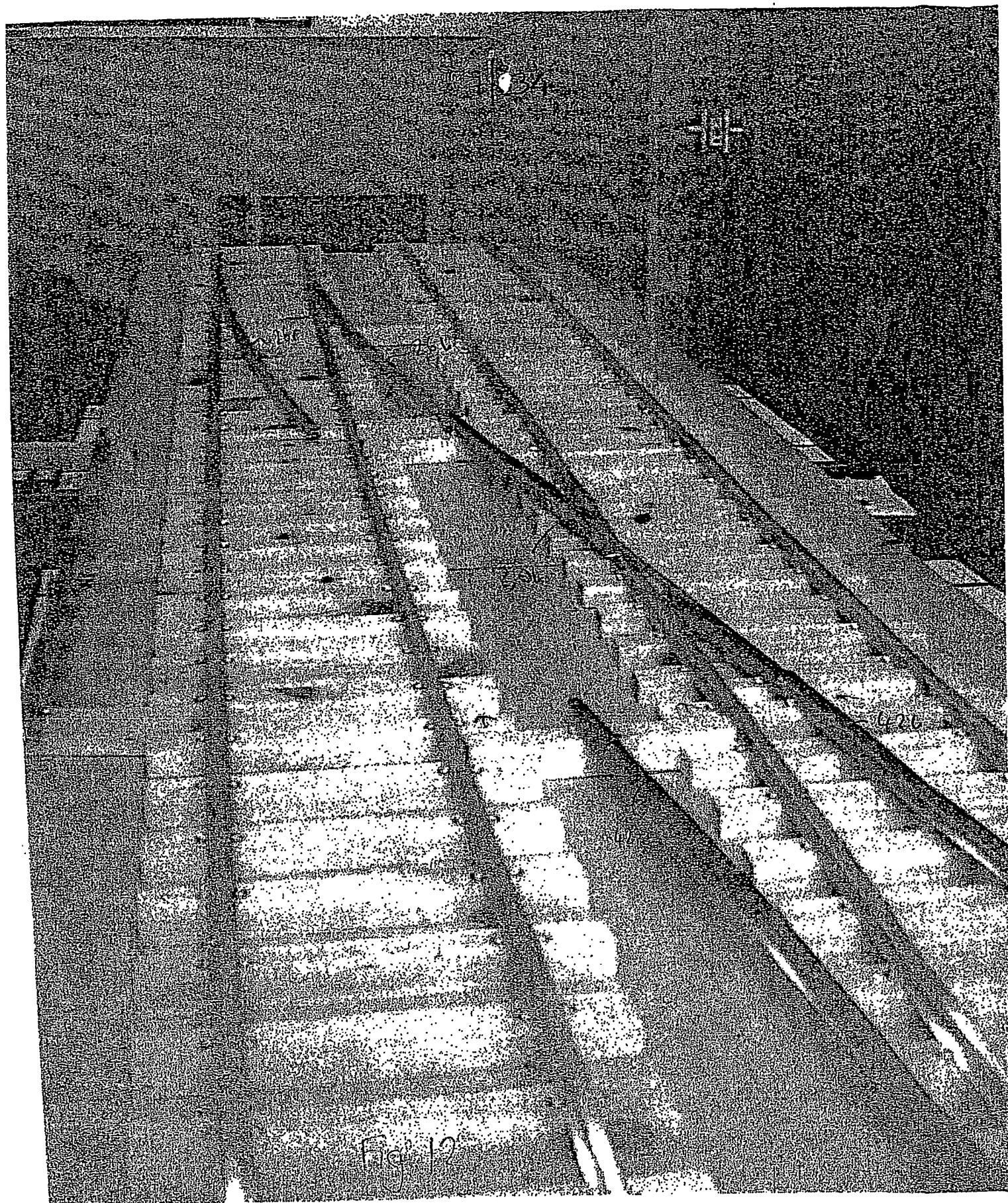
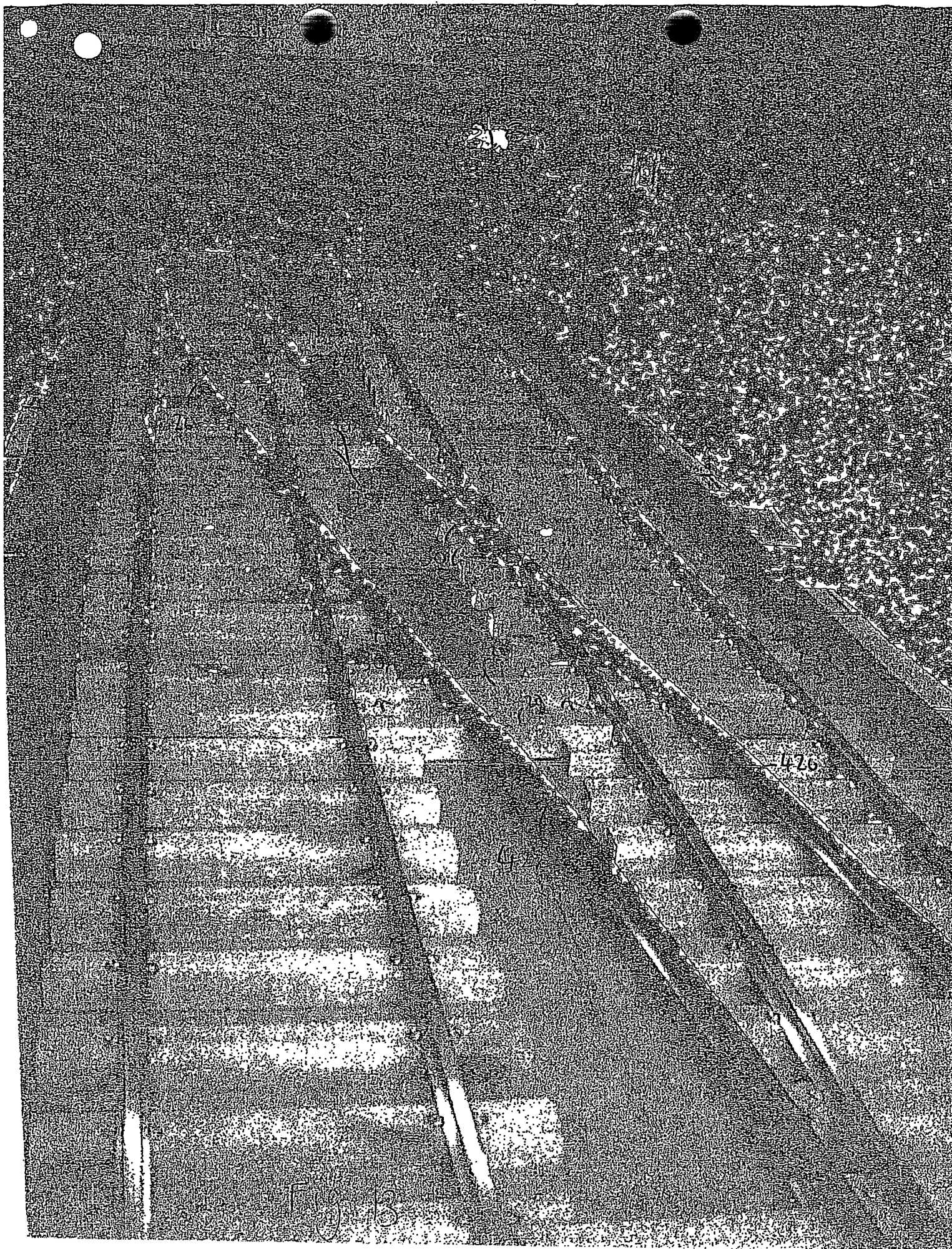


Fig. 10







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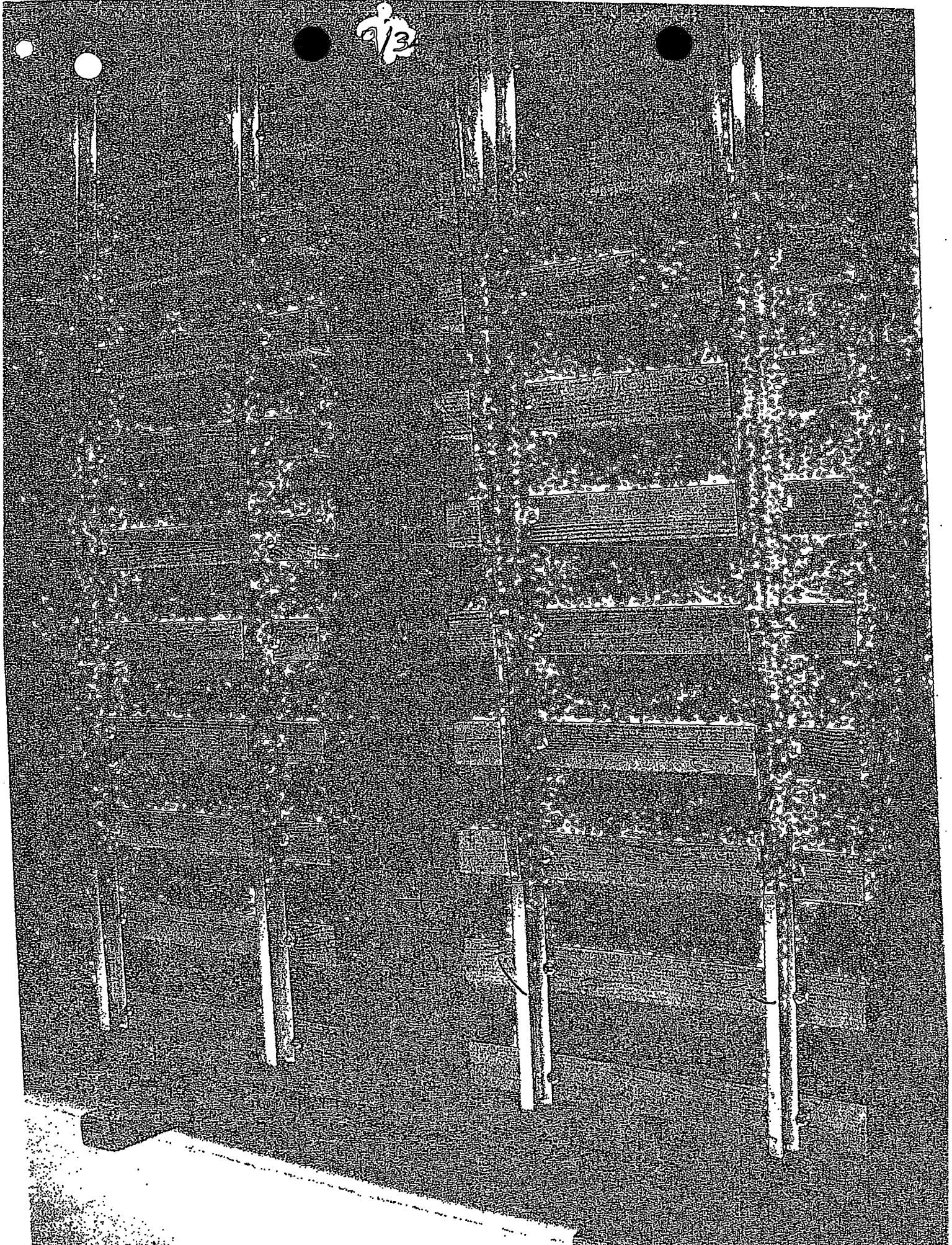




Fig. 15

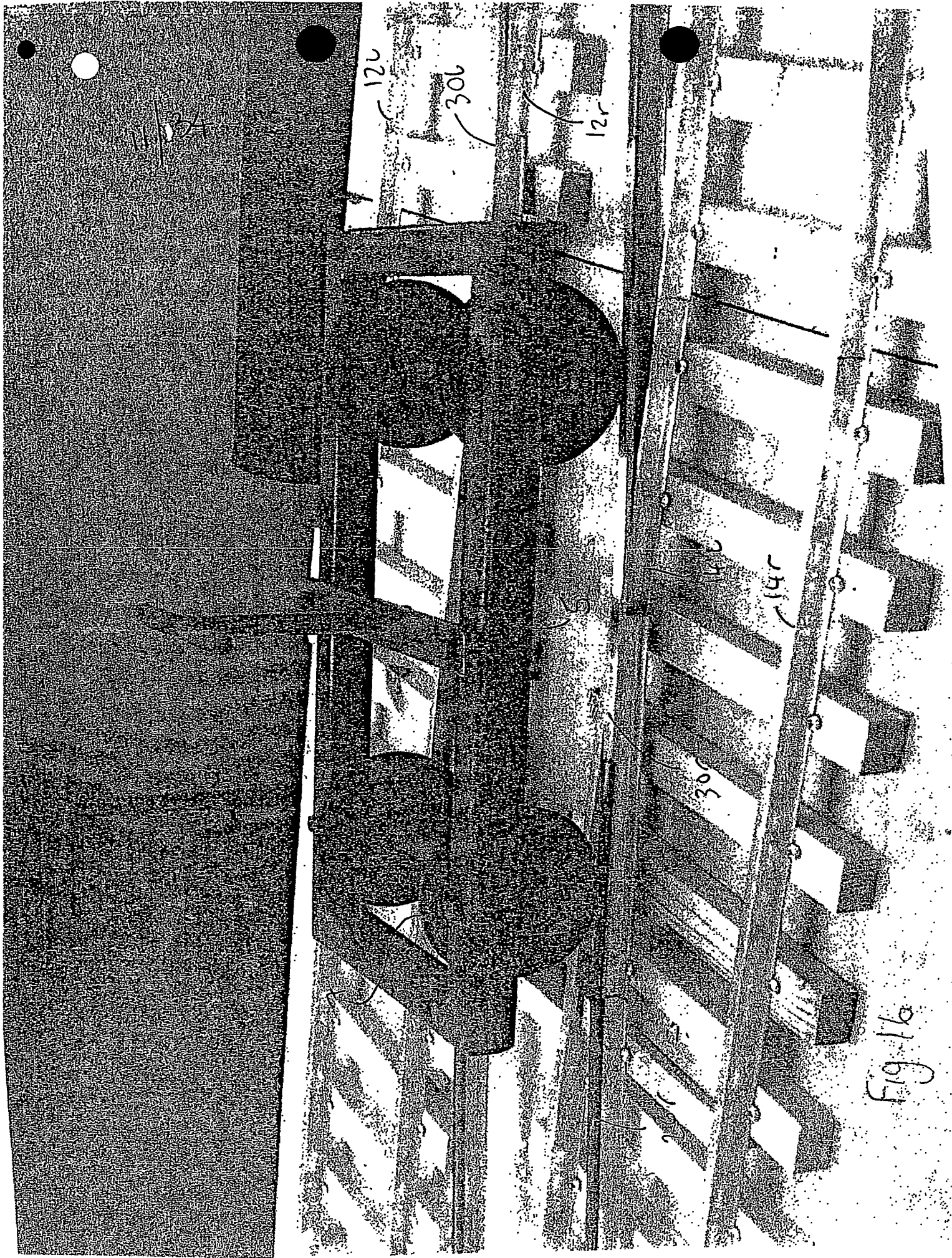


Fig. 16

12/3

27-42

11K

20

5

106

106

1100

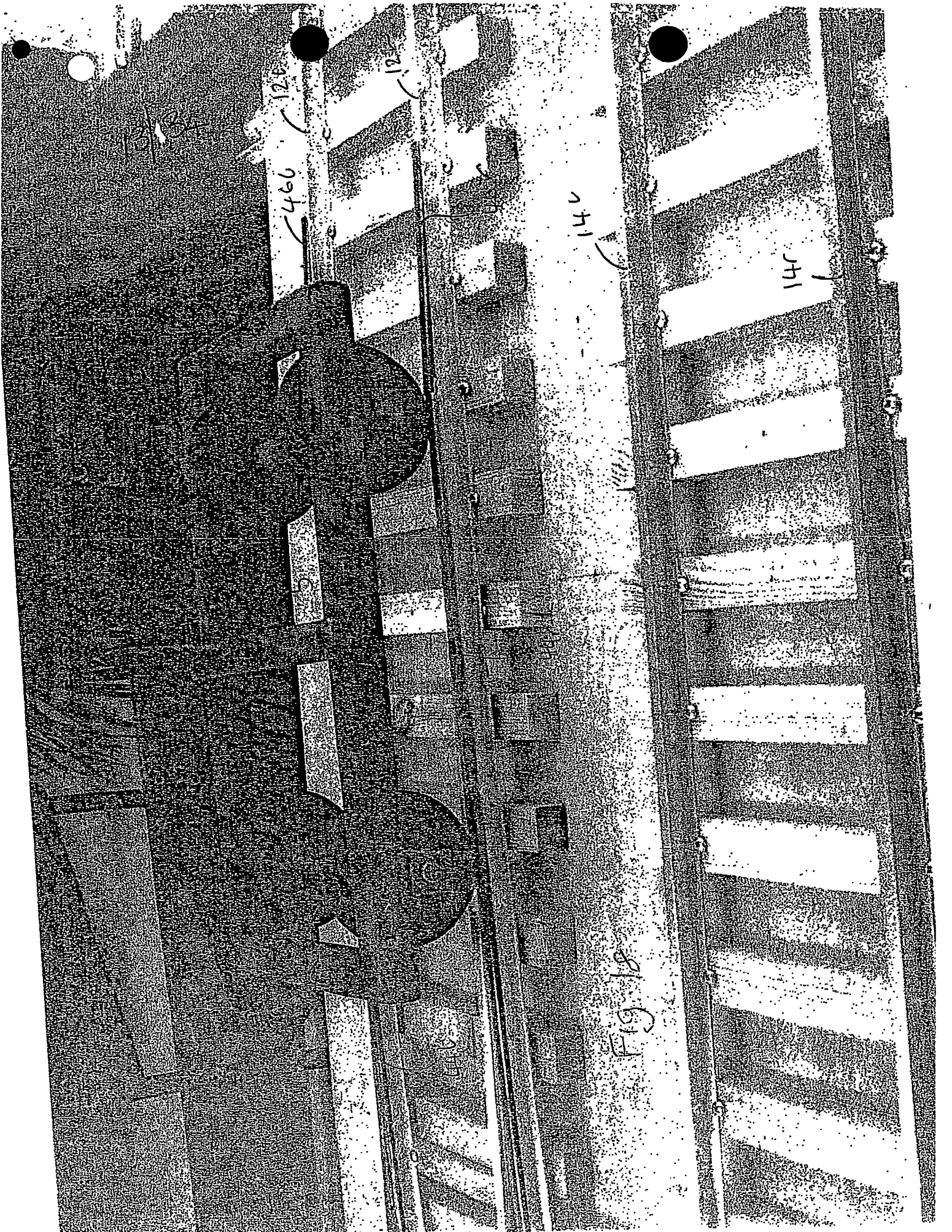



Fig. 18

PLAN ON SWITCH RAIL - MK "S2"

CONFIDENTIAL.
PATENT APPLIED FOR

1	Index added	DNAL	DATE
REVW	DESCRIPTION	UNIT'S	DATE
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Client	XXX		
Contract	NIC		
Title	NON INTRUSIVE RAIL CROSSING UNIT CONCEPT SWITCH RAIL UNIT (GUTS)		
Contract No.	802-112-010	710	
Contract	802-112-010	710	
Drawn	Checked	Approved	Scale
Dalmaro	80	80	1 of 1
Issued for		PAT-APP-02/12/02	

NOTES.

1. Examination of Support *Plata Ista*/concept for Switch Red.
2. Plata frontside Red support over length of switch red.
3. Support details Red not shown.
4. Weight of Steel for one = 1517 lb (6877 t)
5. Preferred options for Switch red.
6. Reinforced over 65mm above permanent way.
7. Flat bar on underside castals with location and details.
8. Switch trip 3 sections approx 2.5m long (229 kg) for handling purposes.
9. Holding down details Red shown.

CROSSOVER SETUP KEY
Scale 1/200

Switched
to 'S2'

Fig 20 a)

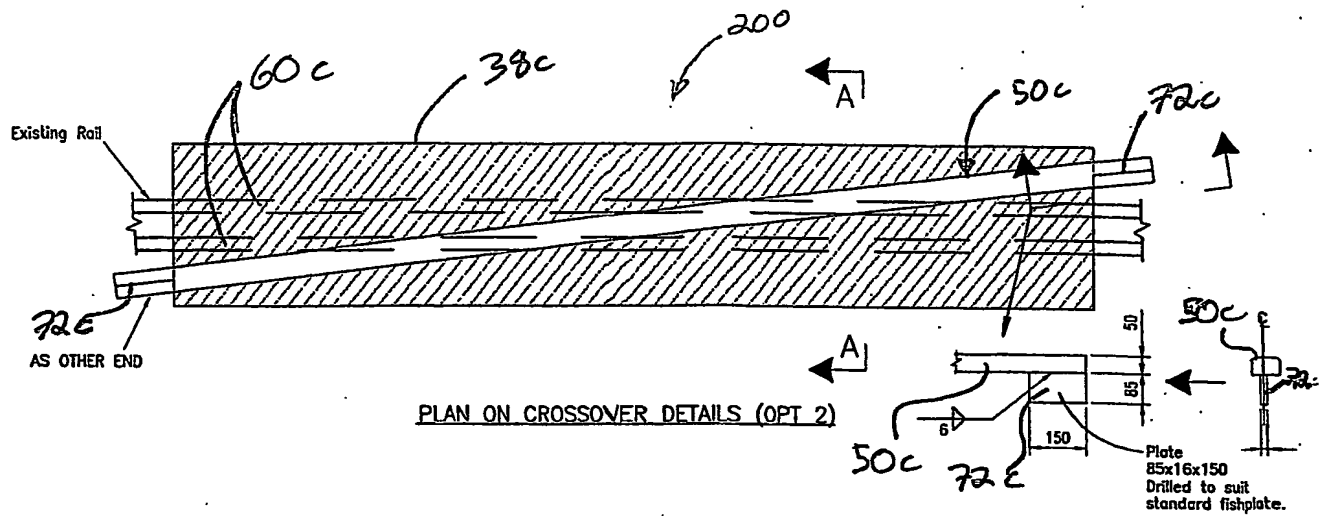
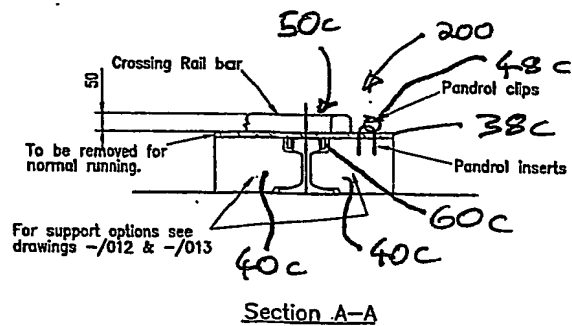
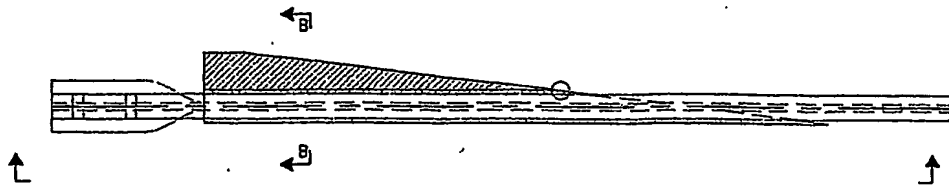


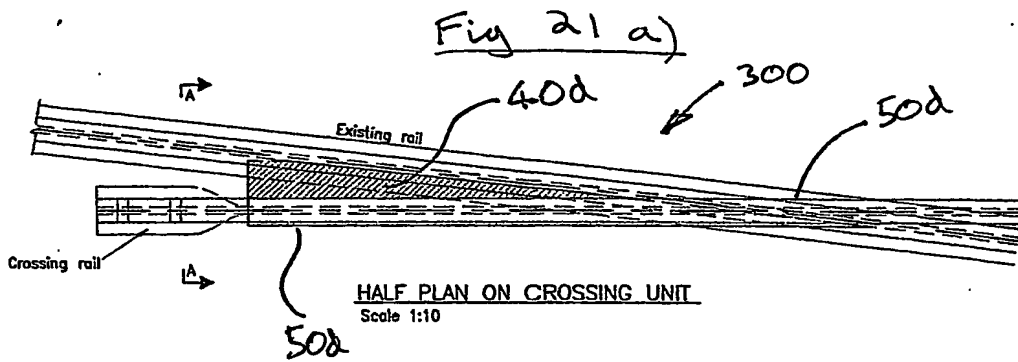
Fig 20b)



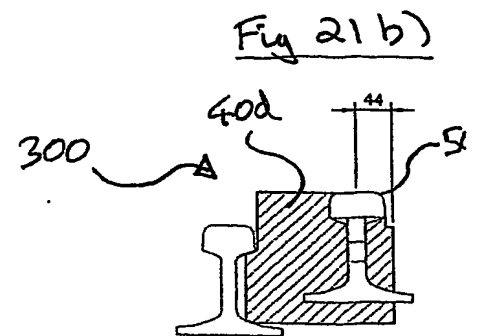
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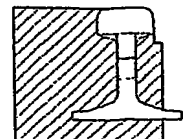
HALF PLAN WITHOUT EXTG. RAIL
Scale 1:10



HALF PLAN ON CROSSING UNIT
Scale 1:10



Section A-A
Scale 1:5



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Fig 22.b)

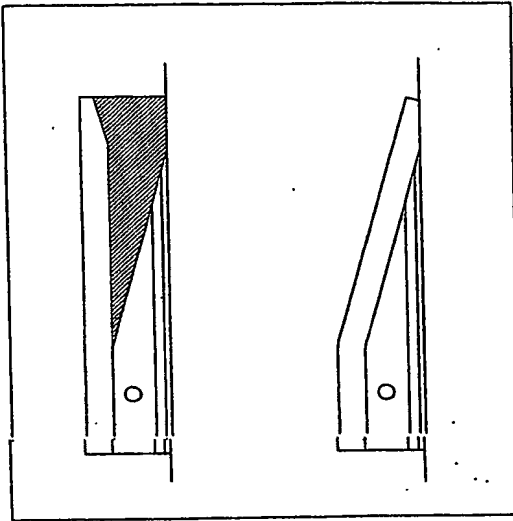


Fig 22.d)

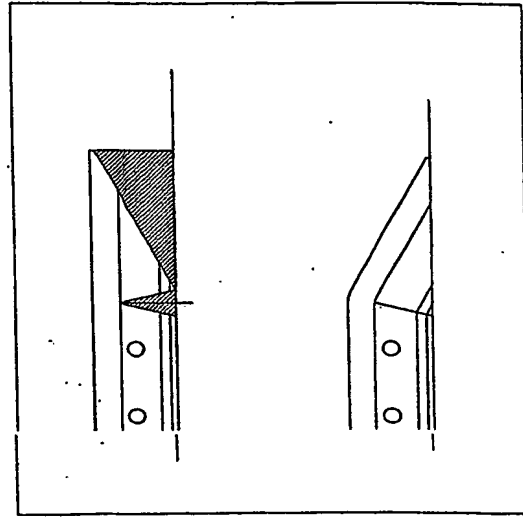


Fig 22.a)

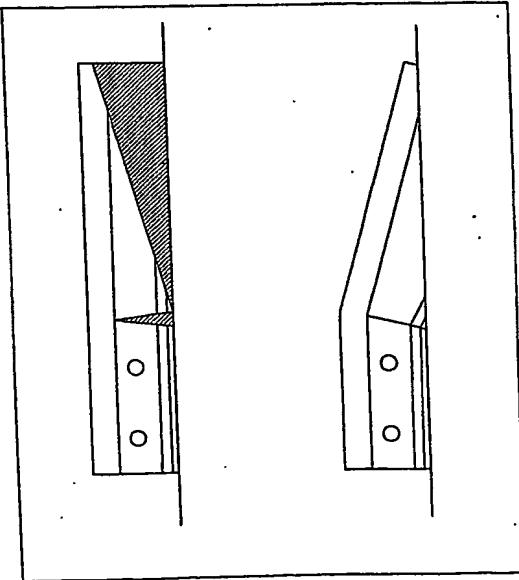
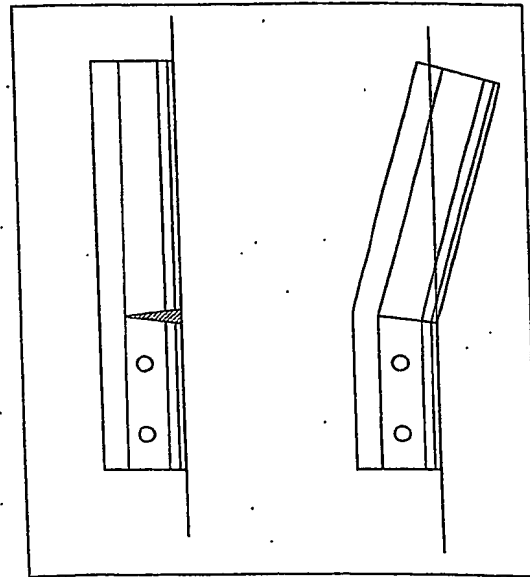
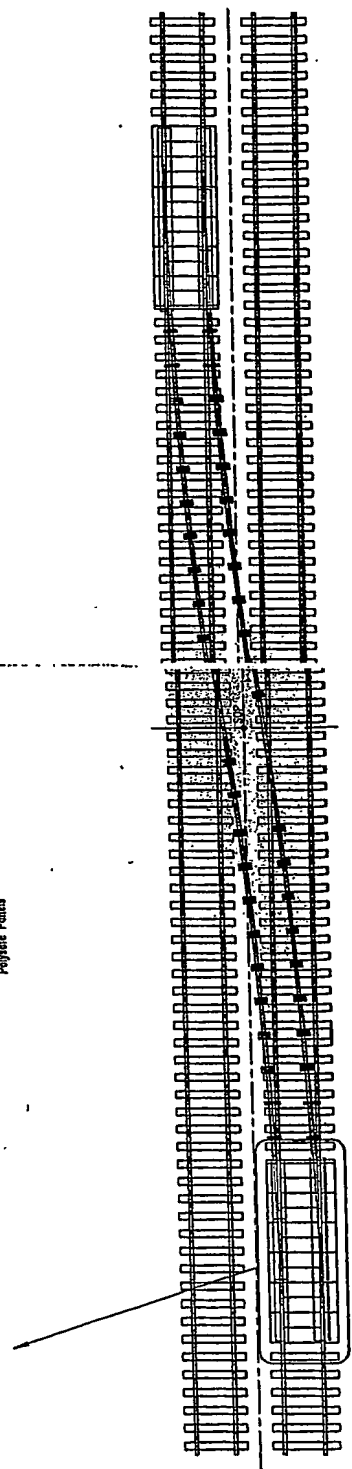
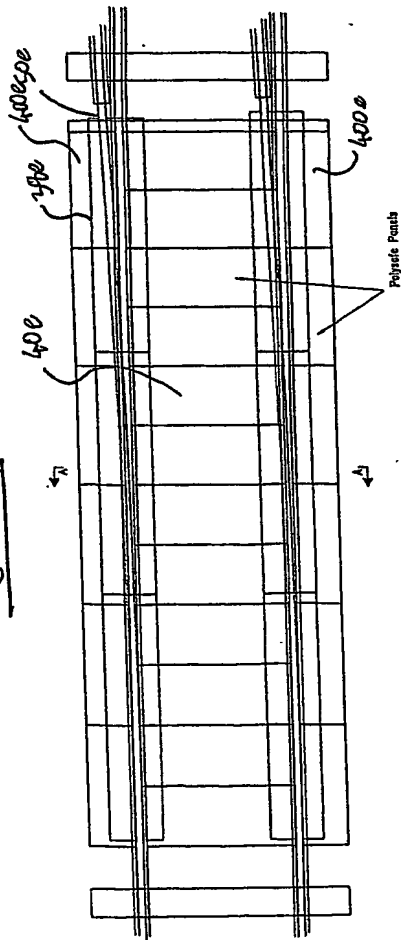


Fig 22.c)

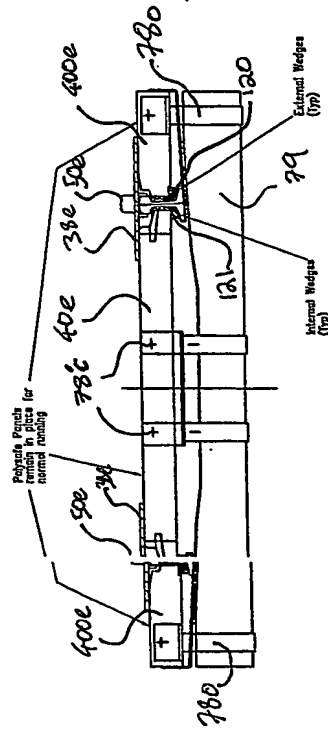


REVISED	DATE	BY	DESCRIPTION
1	02/12/02	J. MULL	SCOTT-TRACK Ltd.
88-42 BROAD STREET, GLASGOW, G40 3PQ Tel: 011 464 3000 Fax: 011 464 3001 Email: info@scott-track.com			
Client	XXX	Contract	NIC
Title: NON INTRUSIVE RAIL CROSSING UNIT CONCEPT SAFETY RAMP OPTIONS			
Contract No.	MD-001-ST	Drawing No.	RCU-02/016
Scale	1:10	Sheet	1 of 1
Drawn	CA/Marco	Checked	RA
Printed on: PAT APP 02/12/02			

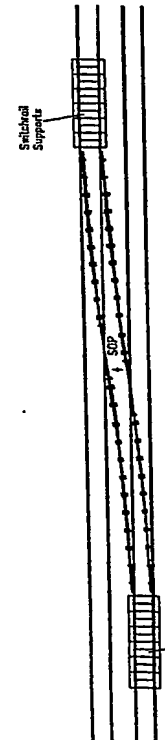
Fig 23a



SWITCH RAIL SUPPLY S Fig 23b



Section A-A
Scale 1/10



CROSSOVER SETUP KEY
Scale 1/200

NOTES

1. Construction of typical level crossing unit for segment (polysele) for Switch rail.
2. Units provide support over full length of unit.
3. Mounting detail not shown.

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REV	1	Key & Notes added	DATE
DESCRIPTION	NON INTRUSIVE RAIL CROSSING UNIT SWITCH RAIL SUPPORTS OPT 2		
<p>SCOTT-TRACK Ltd. 60-68 RICH STREET, GLASGOW G4 2JH Tel: 0141 554 5055 Fax: 0141 554 5051 e-mail: info@scott-track.co.uk</p>			
Customer Ref	SCOTT-401-57		
Contract No	SCOTT-401-57		
Ordering Ref	SCOTT-401-57		
Drawn By	J. J. J.		
Checked By	J. J. J.		
Approved By	J. J. J.		
Sheet	1 of 1		
Issue Ref	PAT APP 02/12/02		

20/34

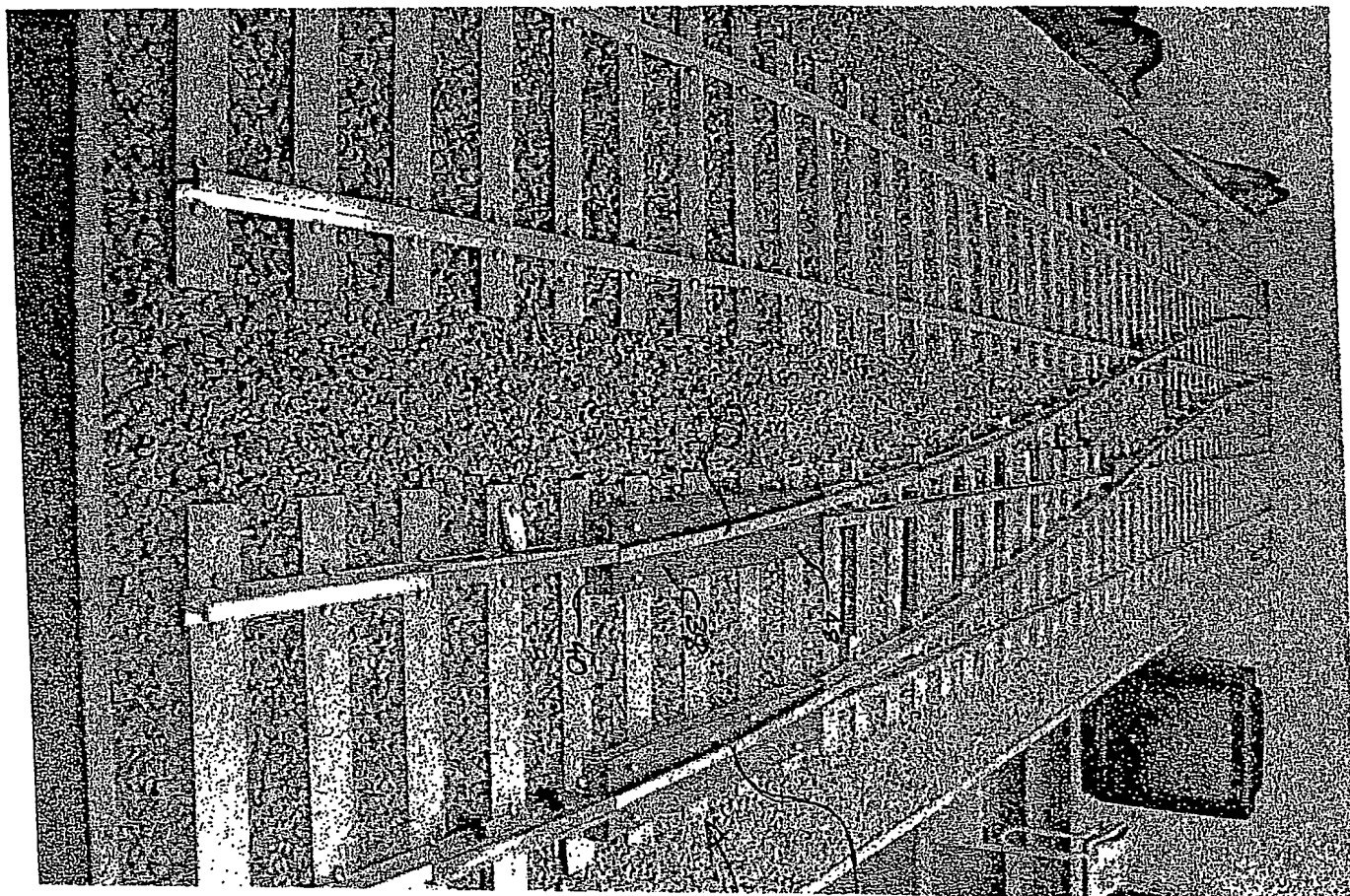


Fig 24a

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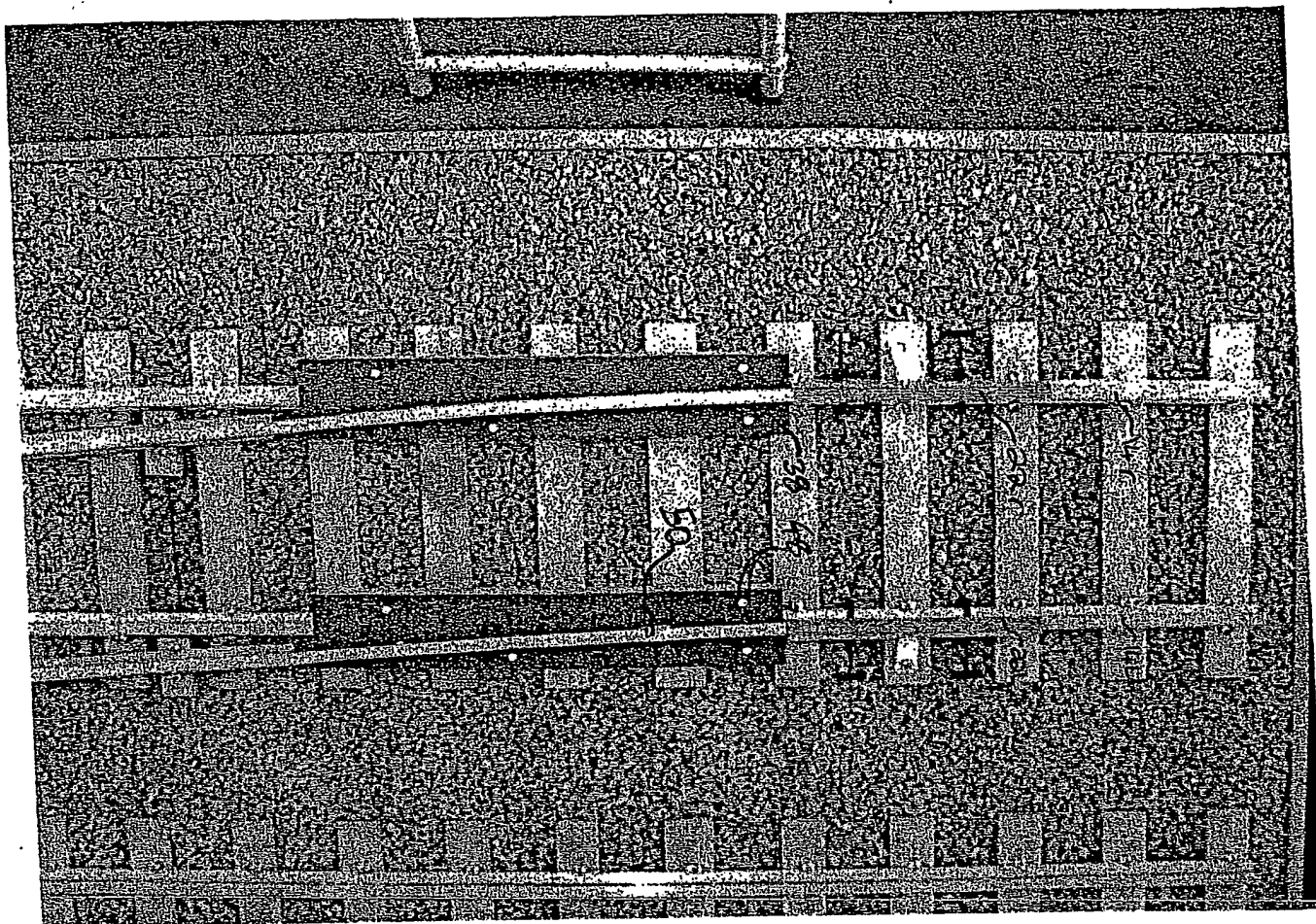


Fig 24b)

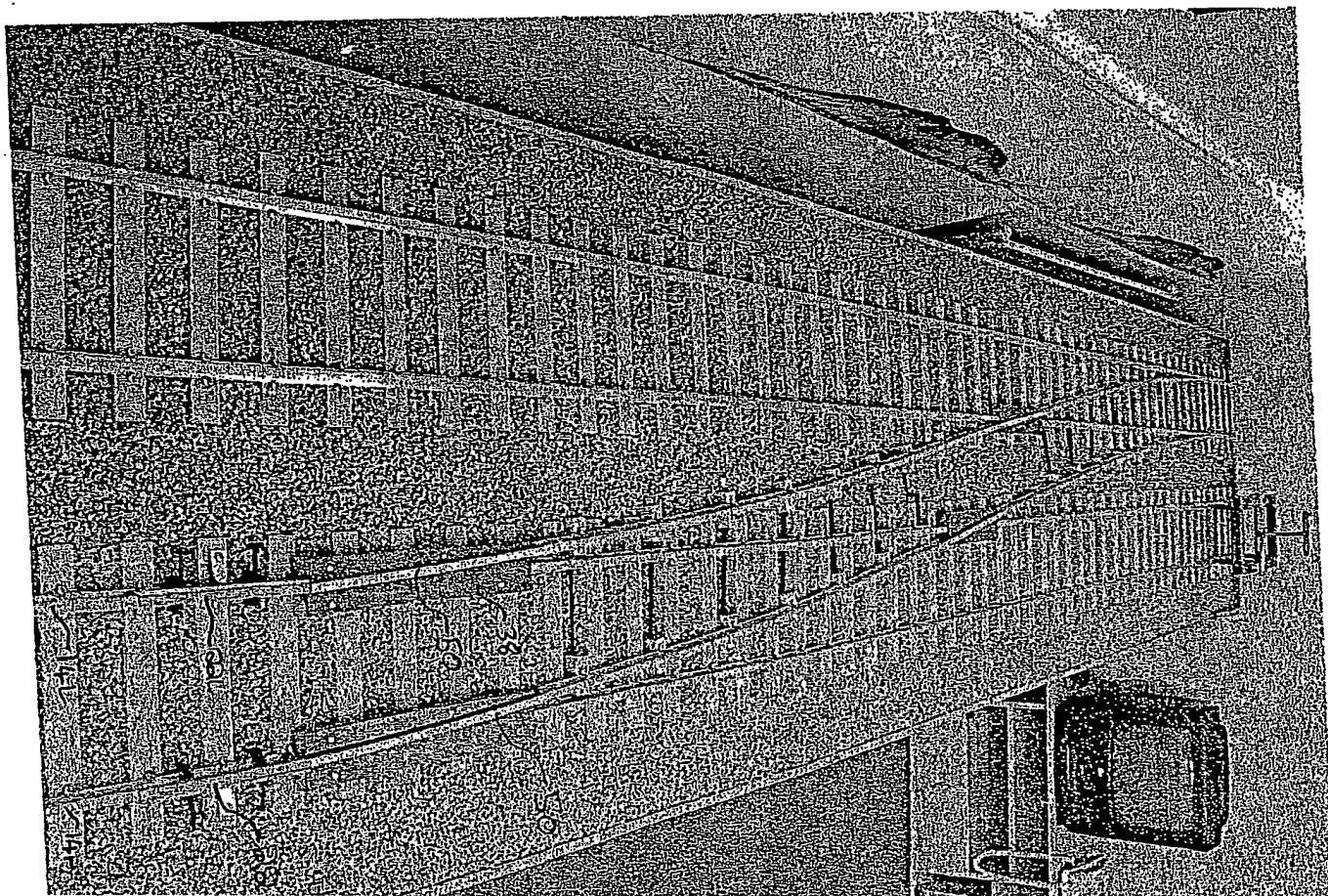


Fig 24c)

Fig 25a)

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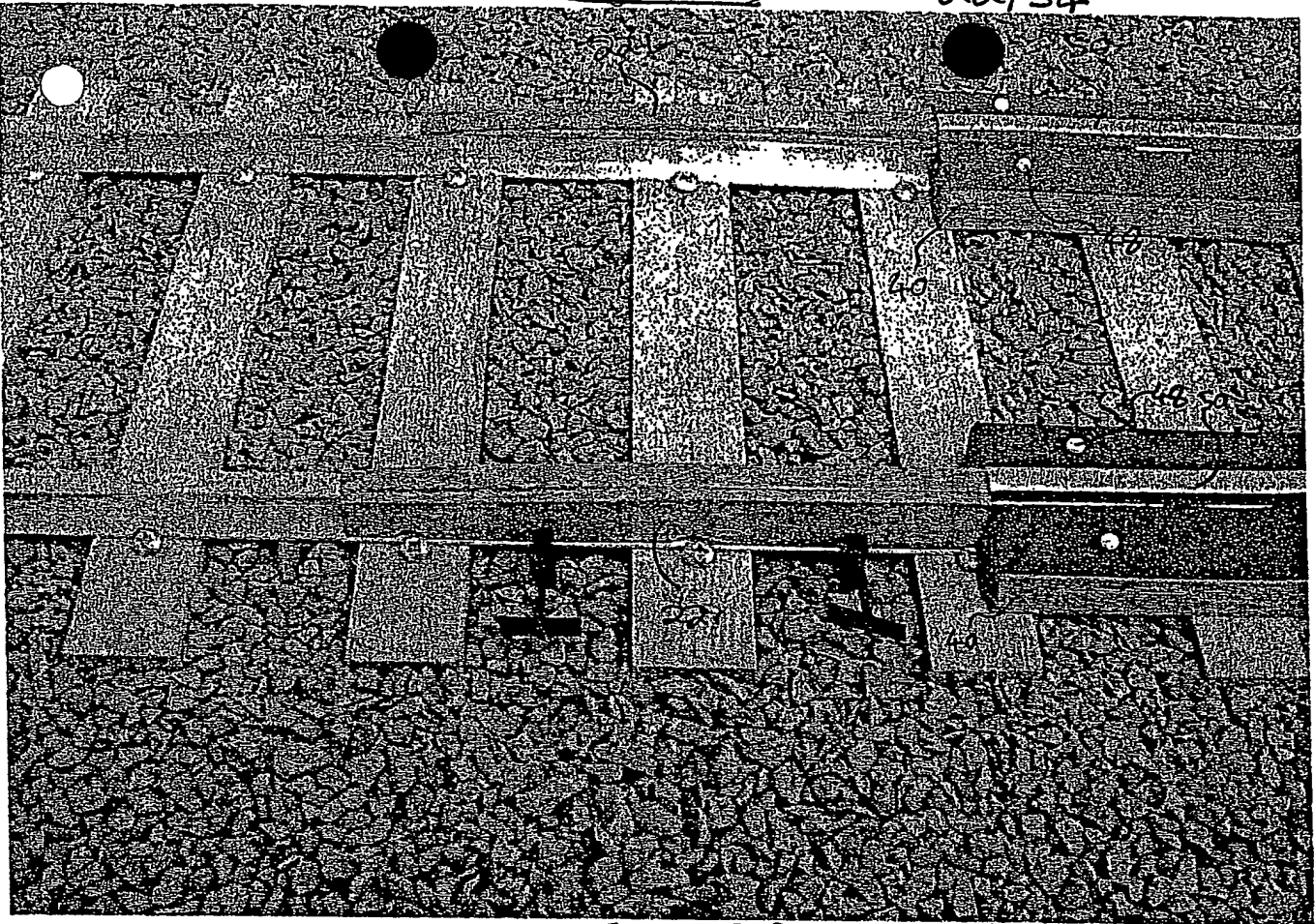
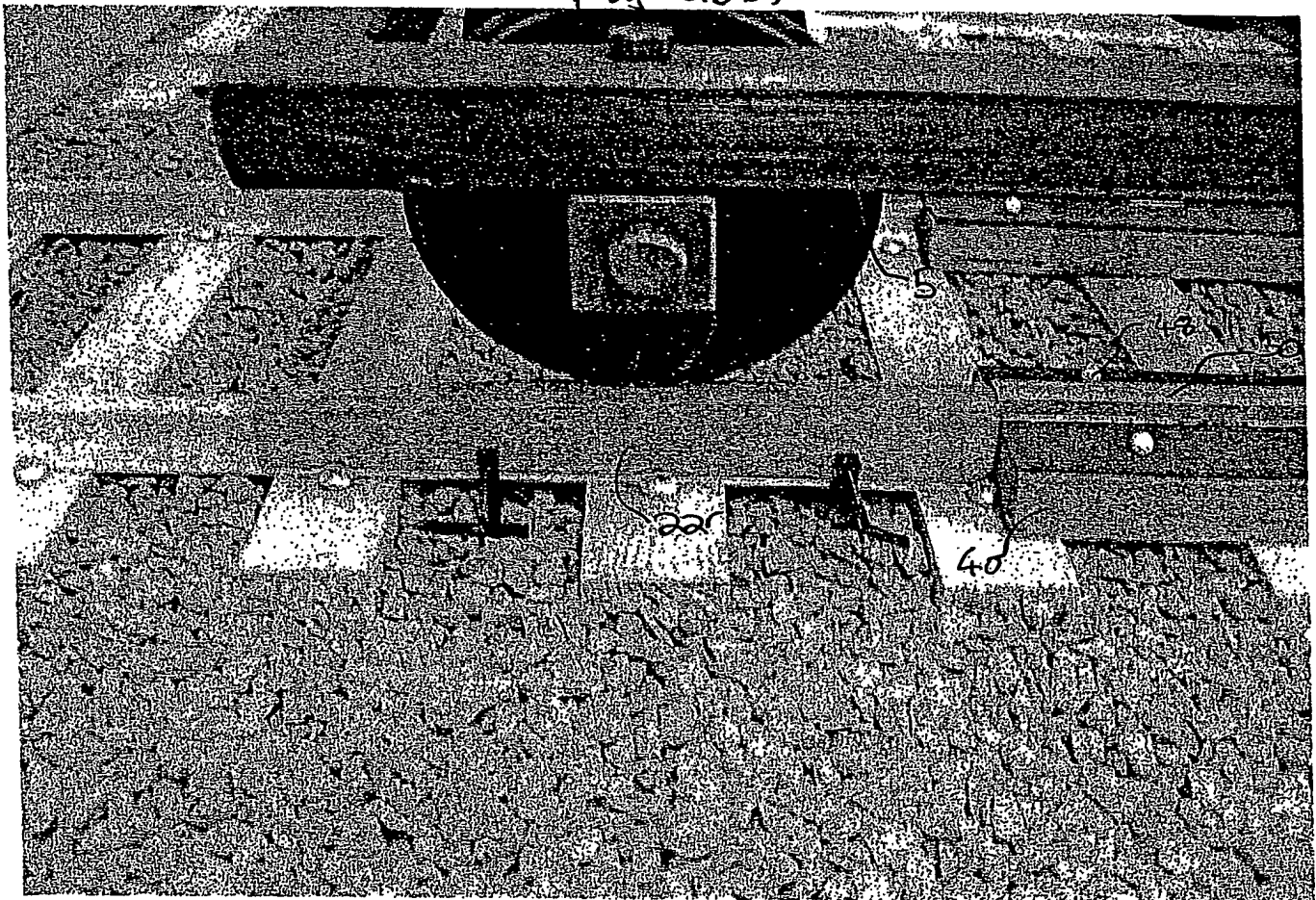


Fig 25b)



ry 20

23/54

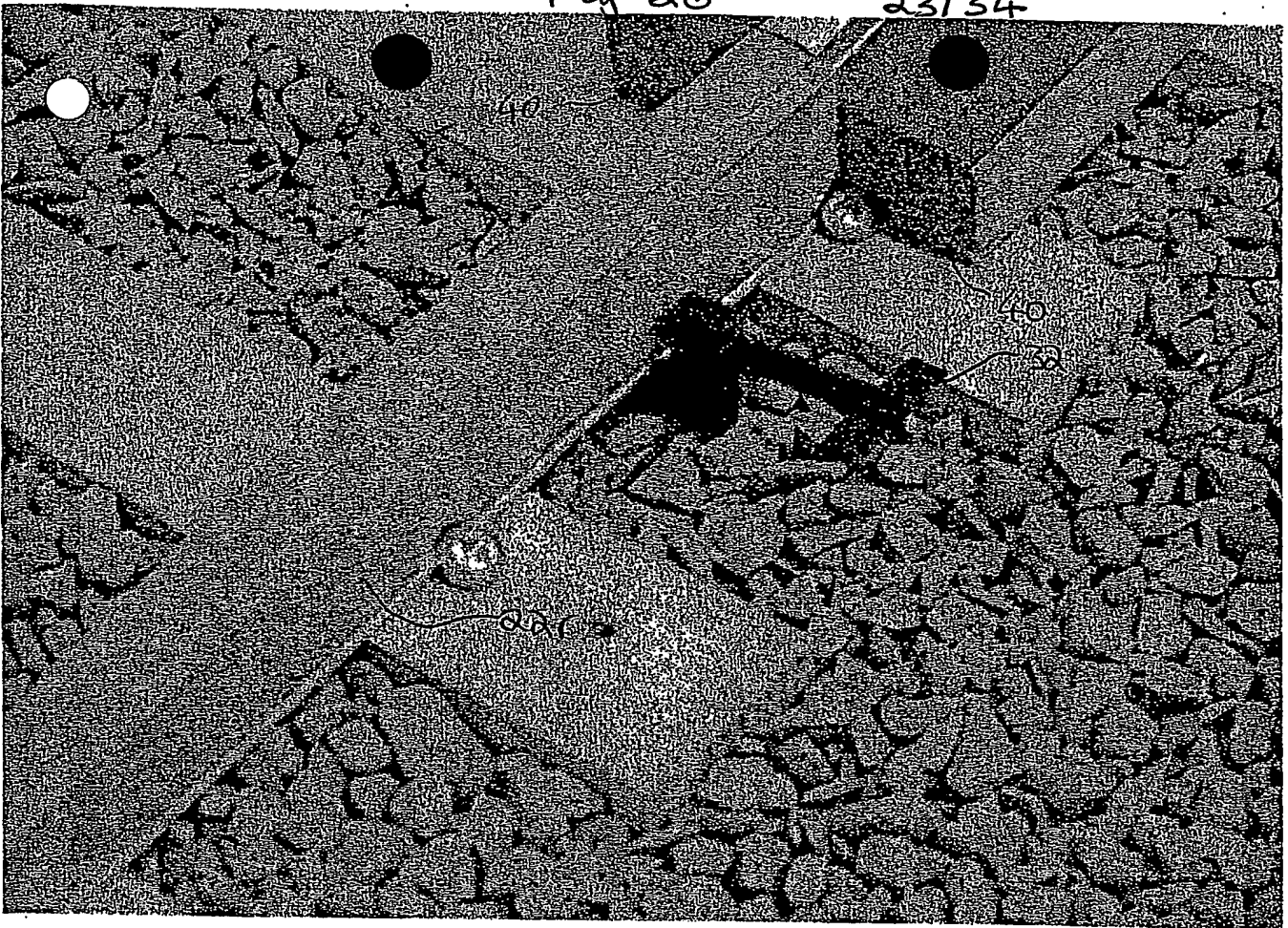


Fig 2.1.1

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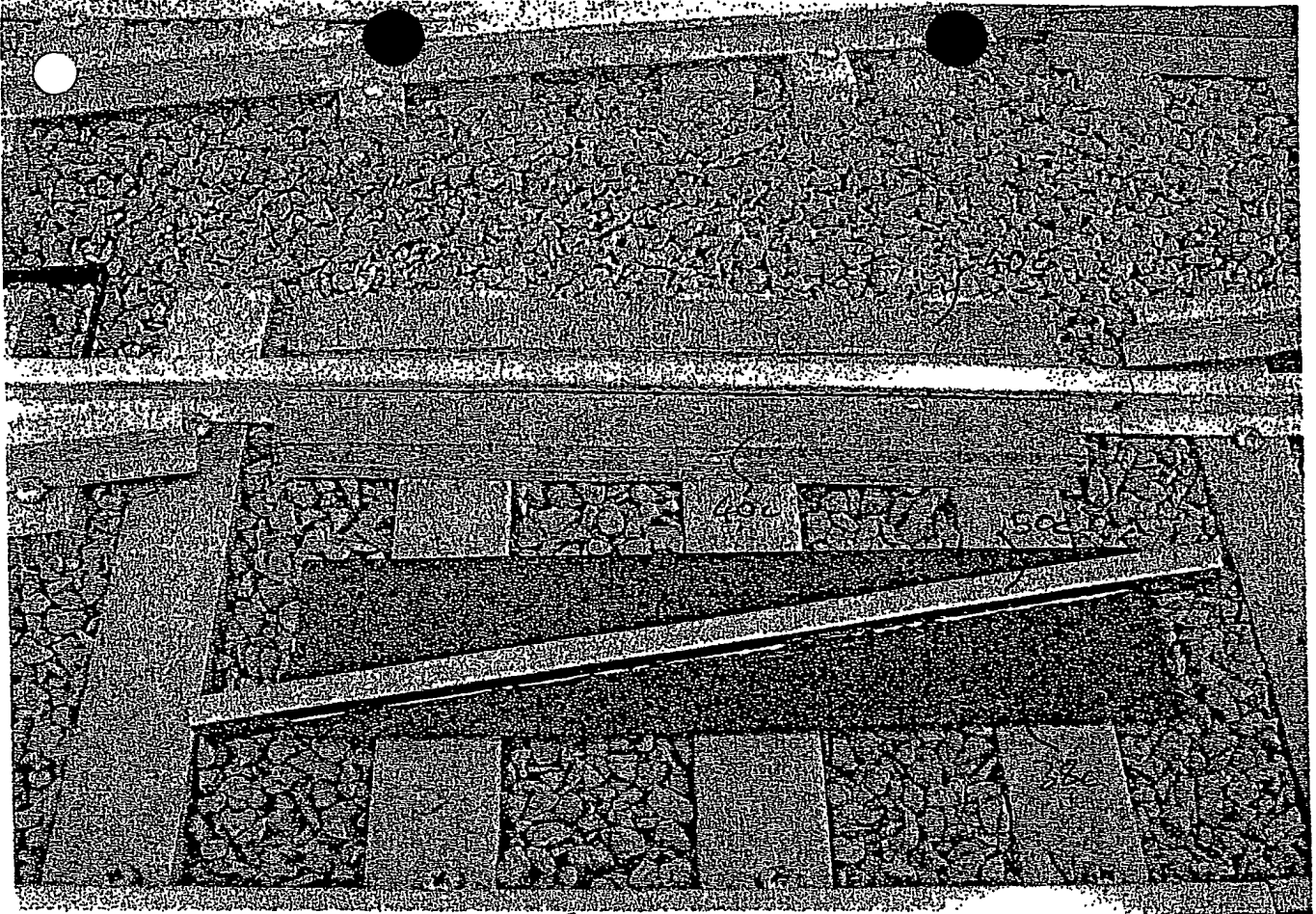
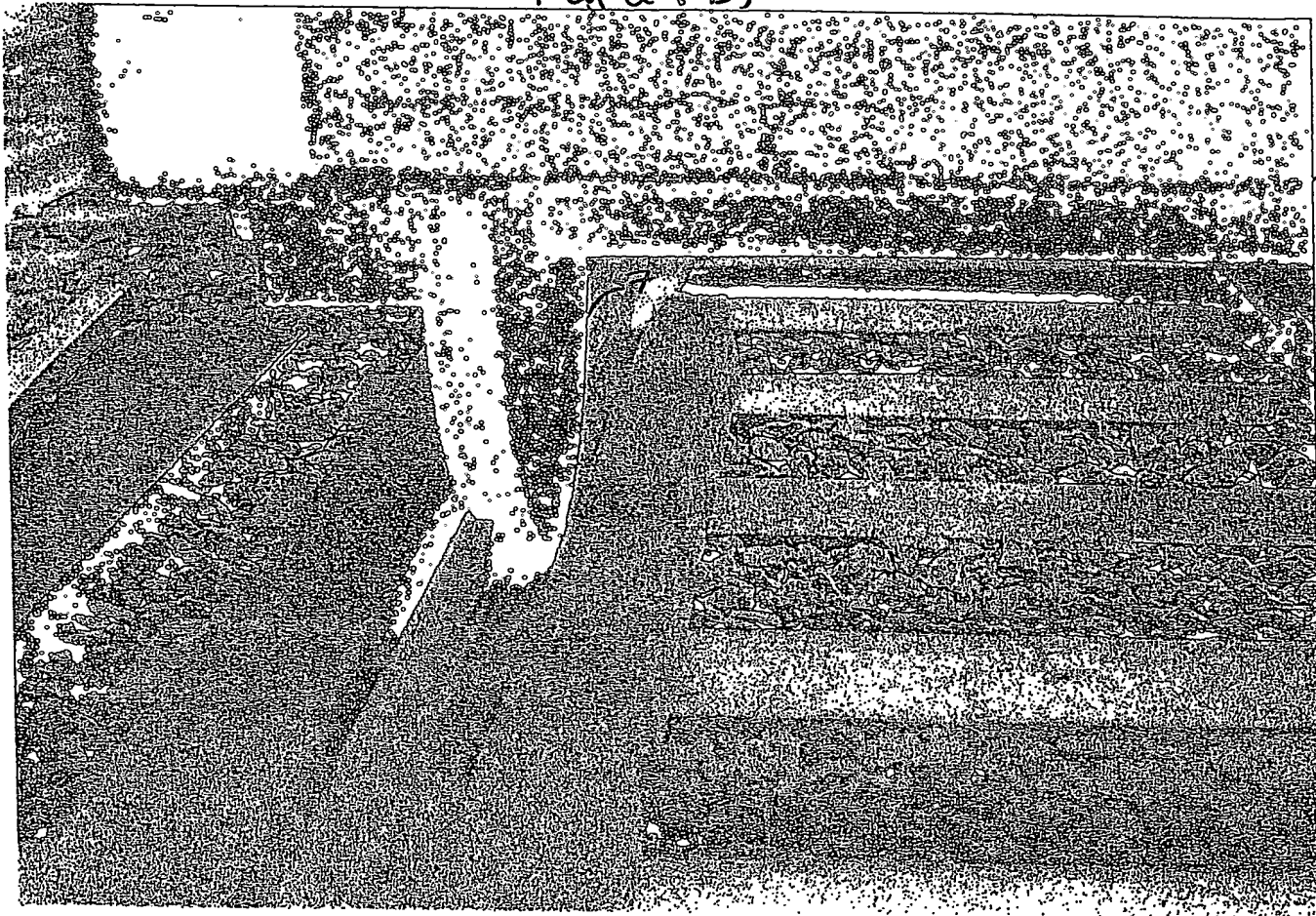


Fig 2.8a)





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Fig 29d)

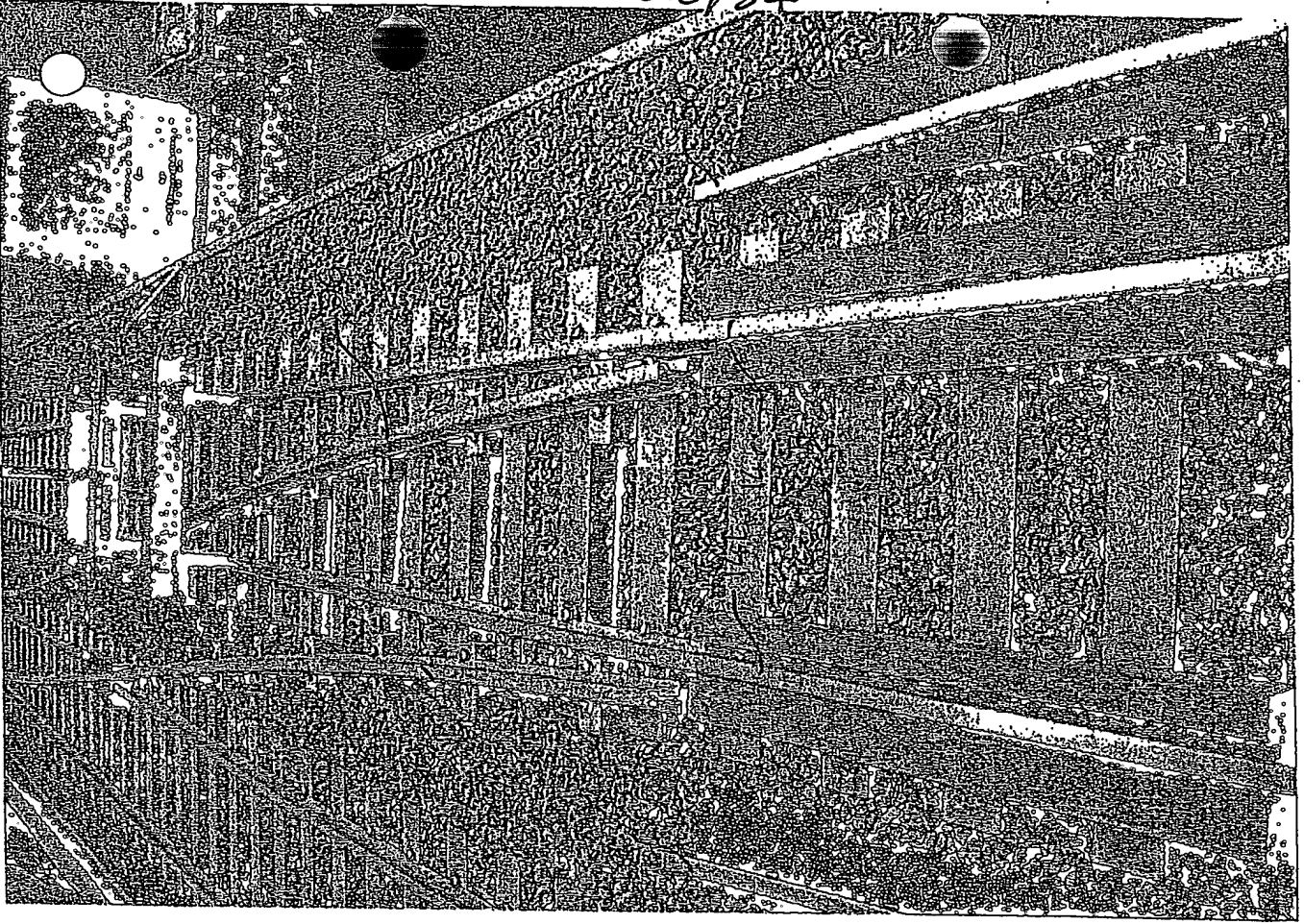


Fig 29c)

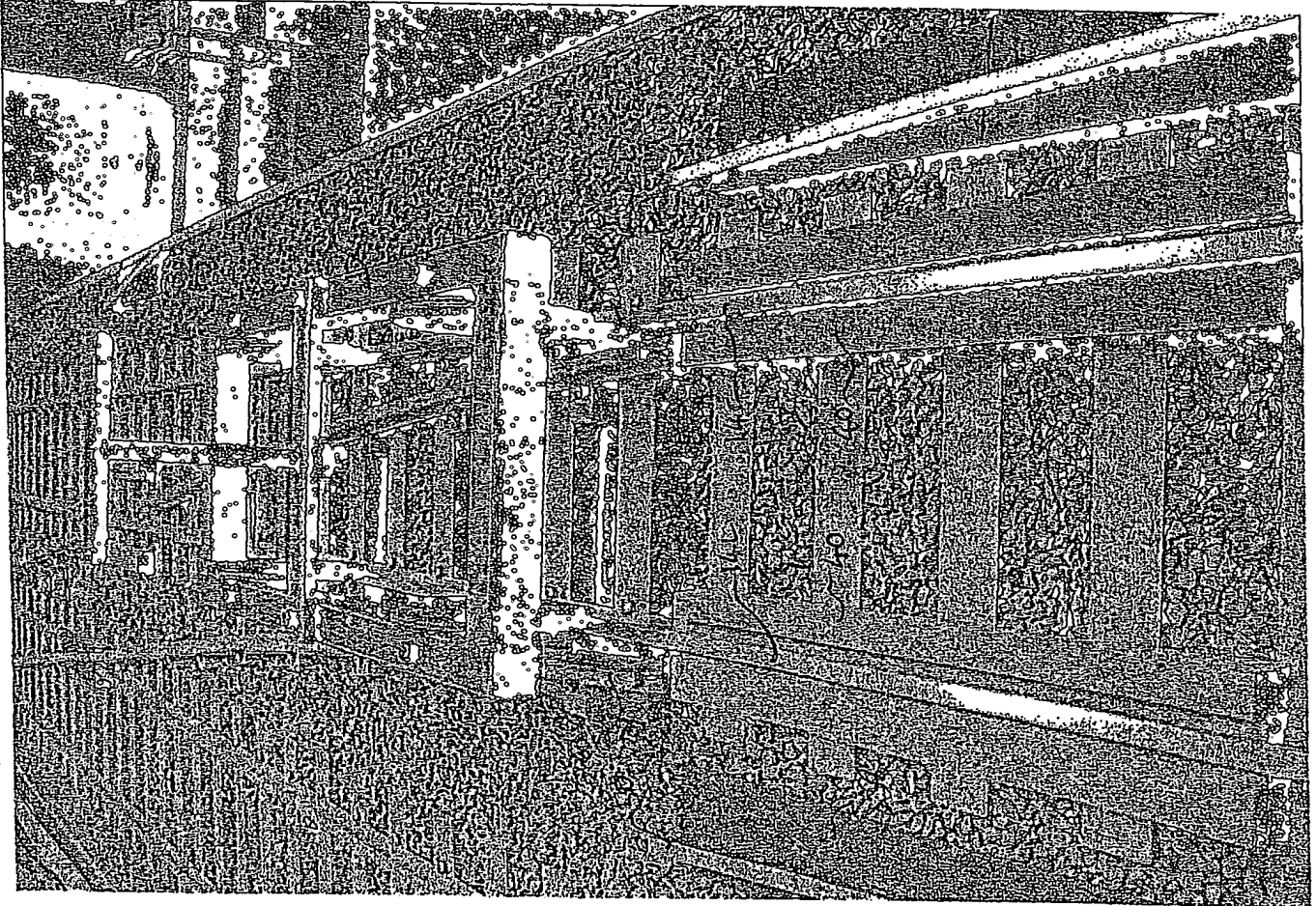


Fig 29f

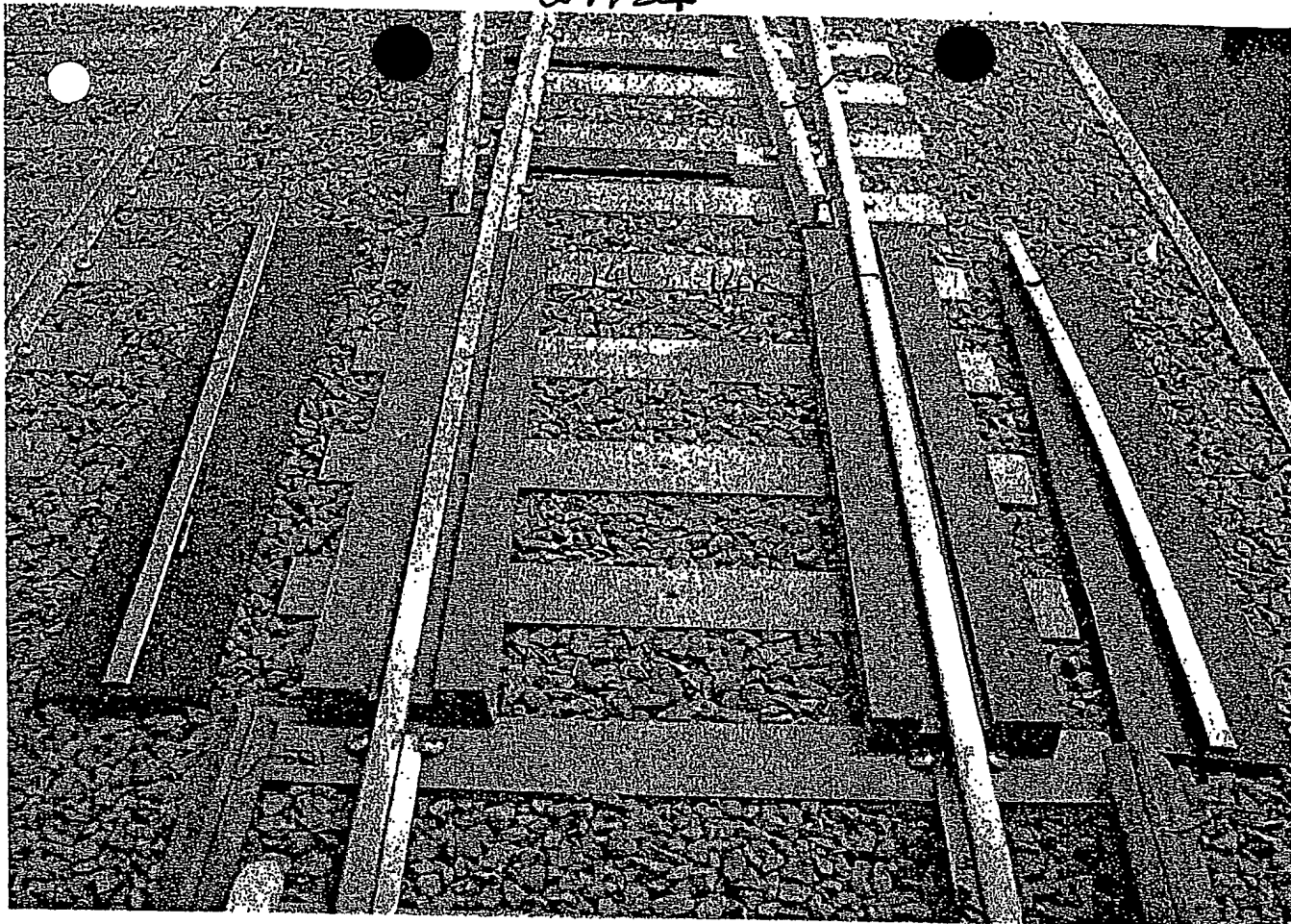
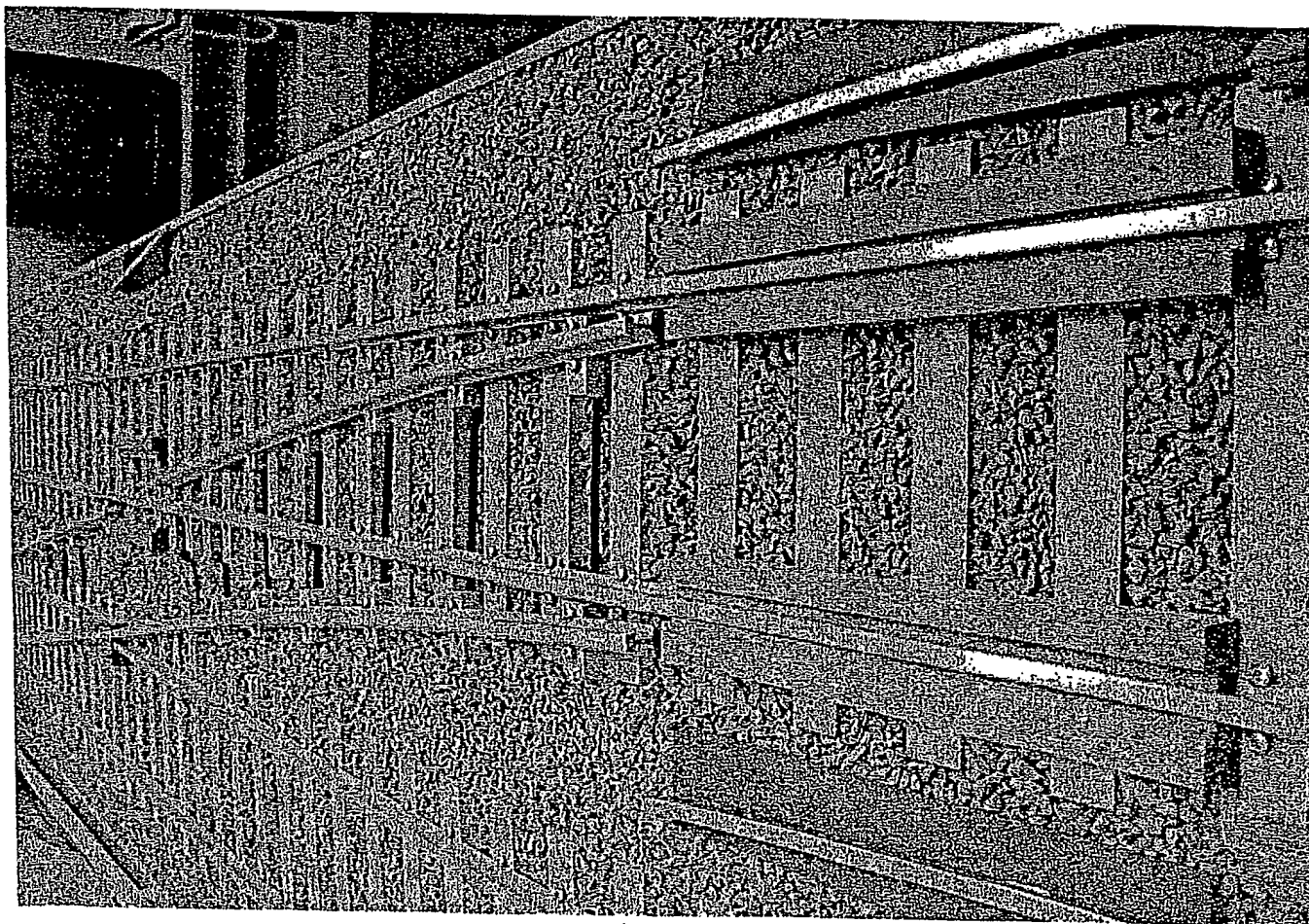
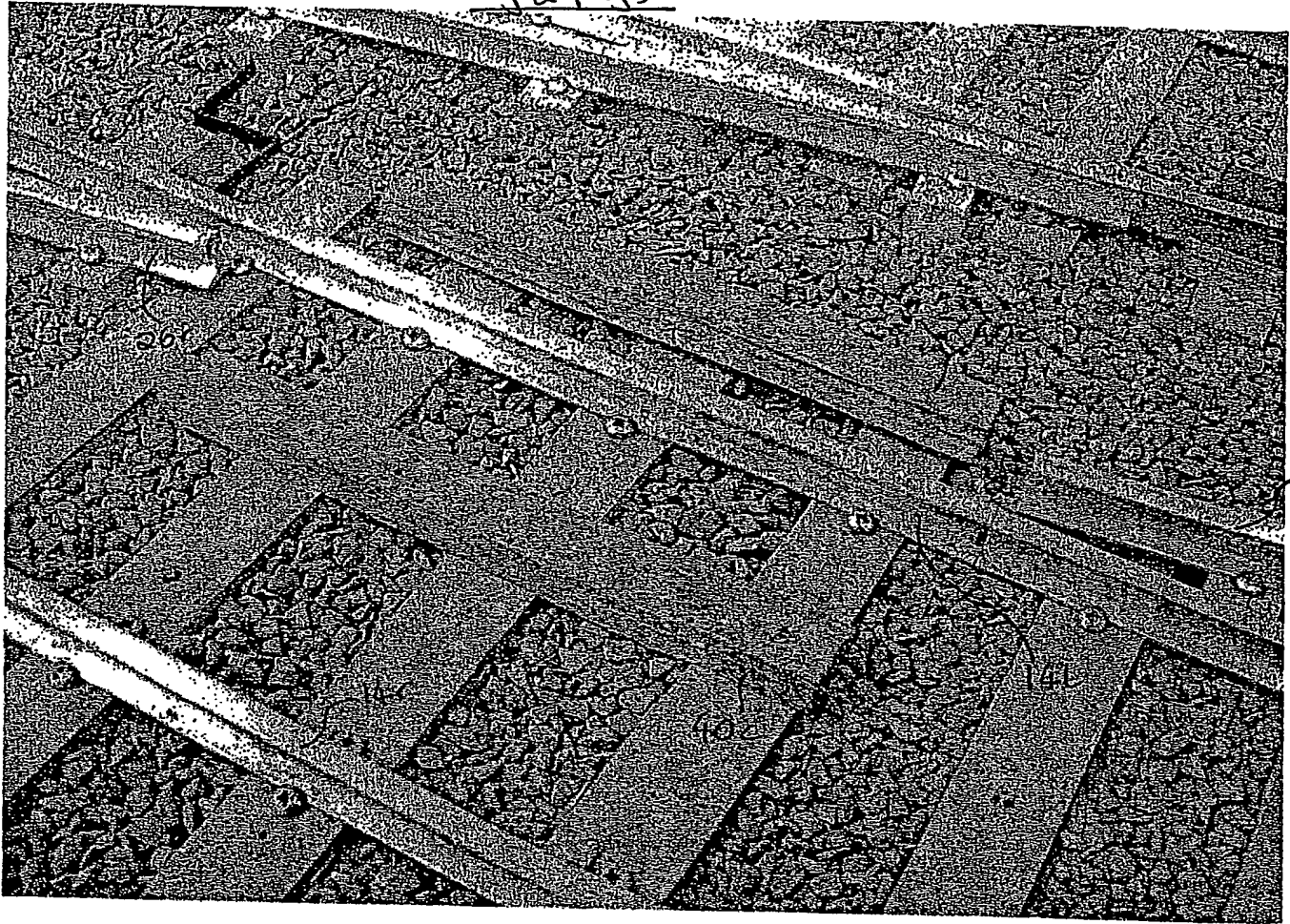


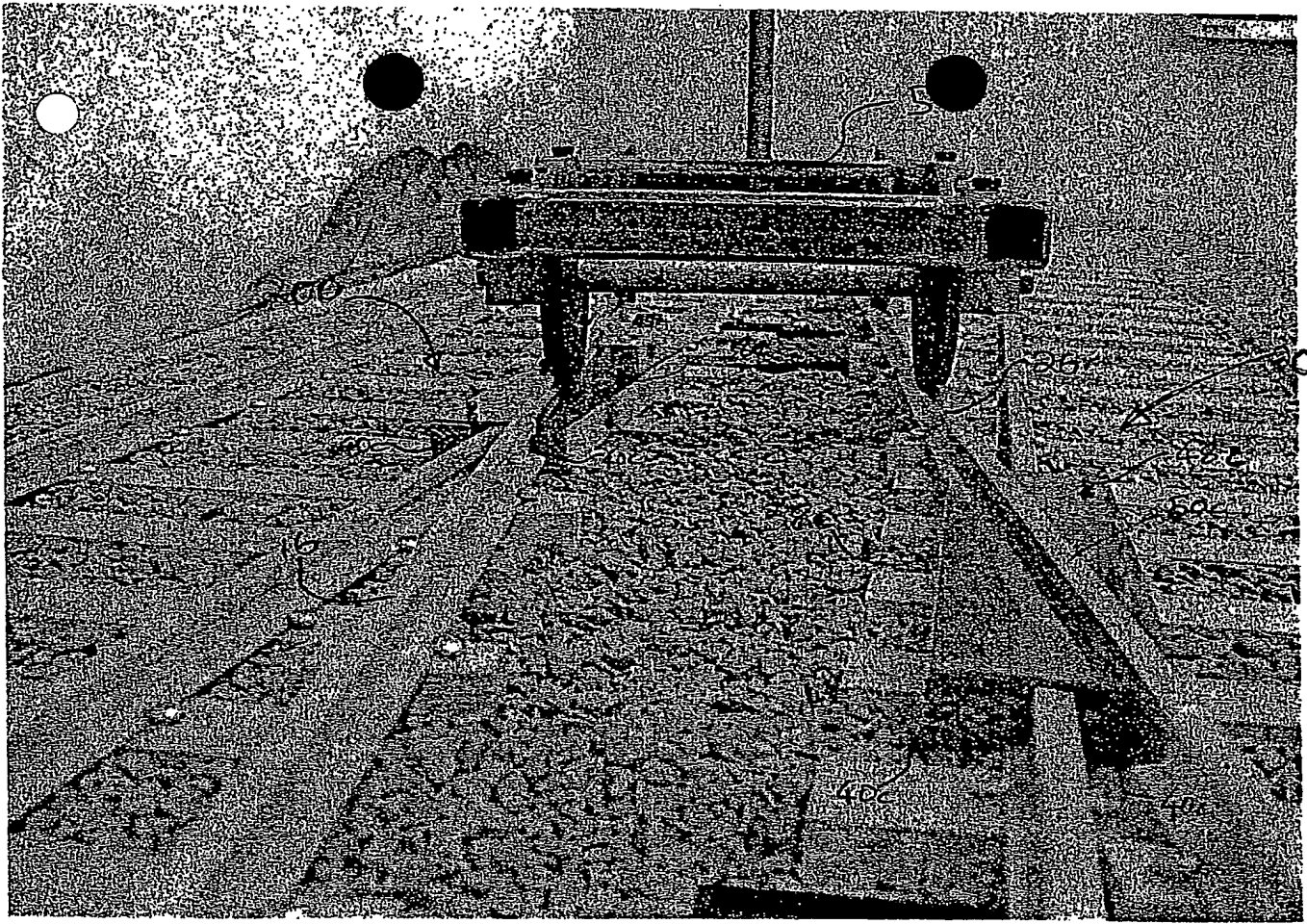
Fig 29e



28134

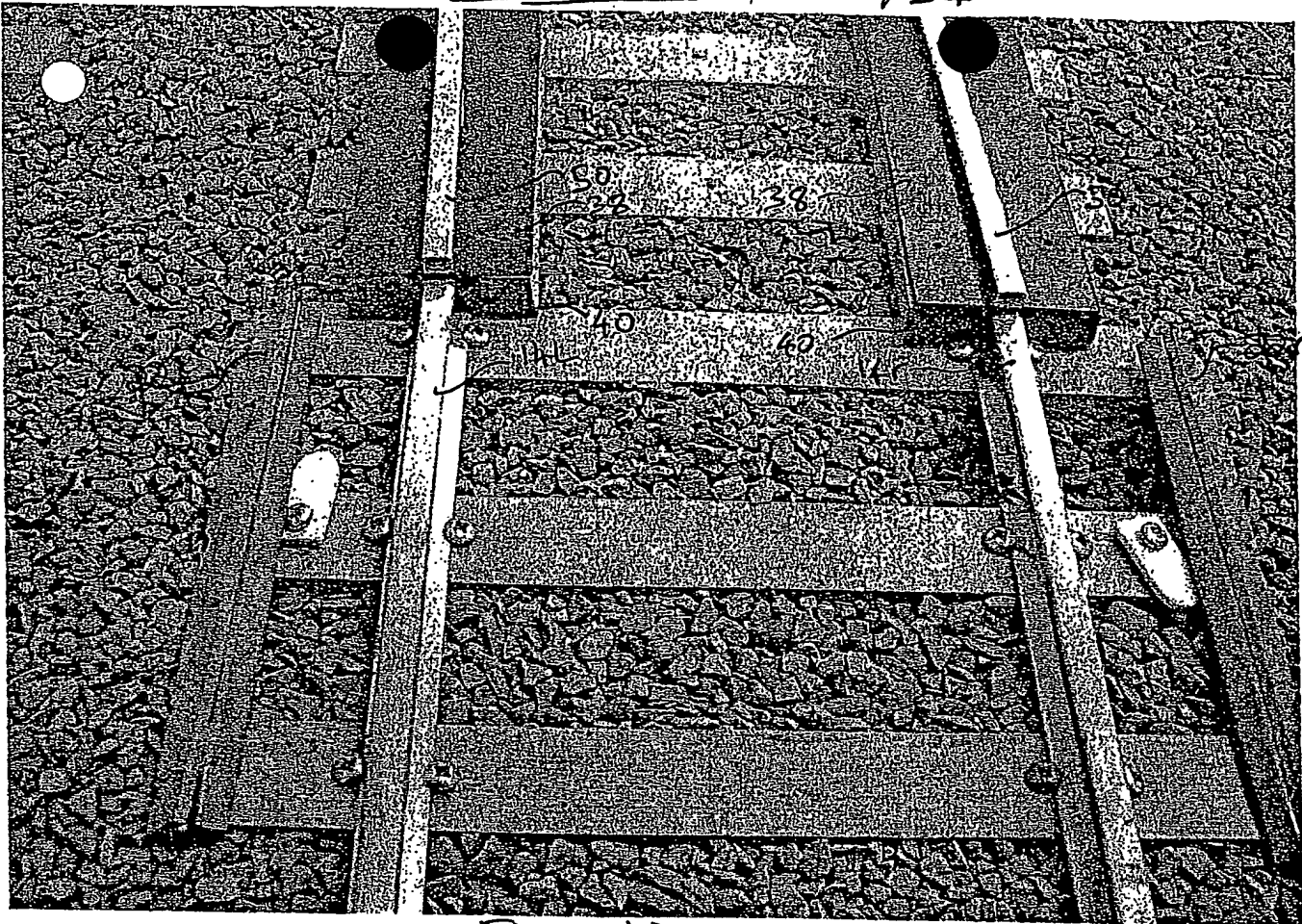
Fig 29 a)





Fly 31a)

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Fly 31b)

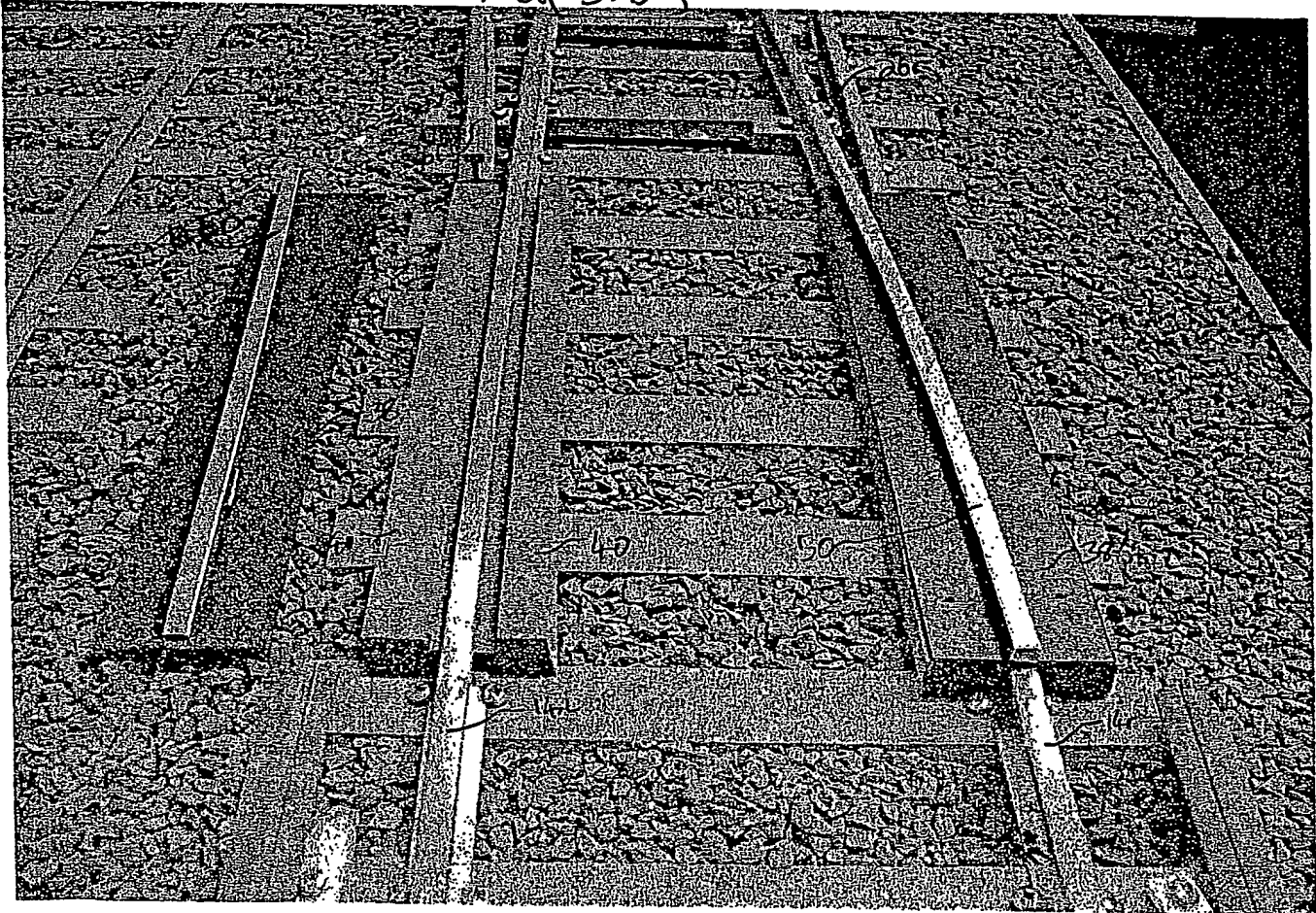
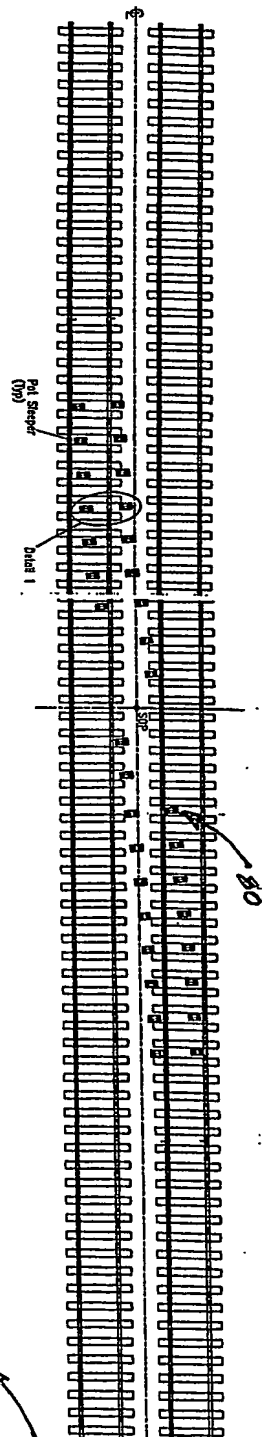
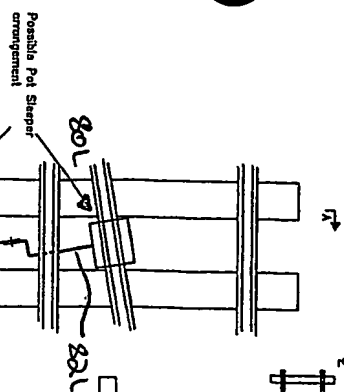


Fig 32a)



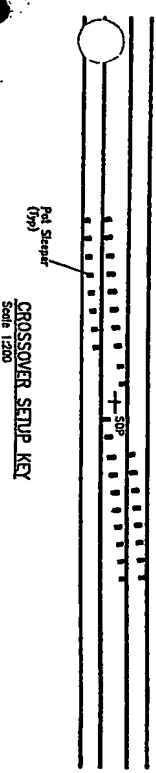
SLEEPERS LAYOUT



SECTION A-A
Scale 1:20

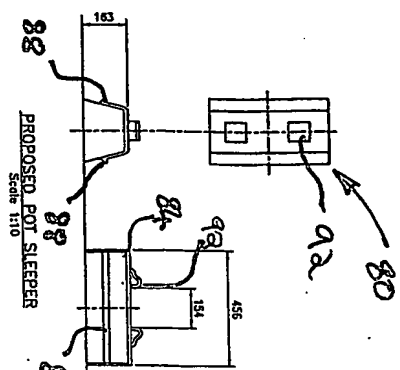


Fig 3a,b



CROSSOVER SETUP KEY

NOTES.



F. 330 (c)

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1	Kryoflex & Drisks added	DRINK
SCN	DESCRIPTION	WTS
<p>SCOTT TRUCK Ltd. 66-62 BUDD STREET, GASTOWN, VAN. B.C. VAN. B.C. V6E 2K1 TEL. 671-3111</p>		
Contract	NON	
Contract	NC	
Title	NON INTRUSIVE RAIL CROSSING UNIT CONCEPT POT SLEEPERS ADDED	
Contract No.	NC-001-ST	Issued Date
Date	17.02.02	Scale
Drawn	Checkered	1:100
Approved	1/1/01	Sheet
1/1/01	1/1/01	1/1/01
PAT. APP. 02/12/01		

✓ need

Fig 33a)

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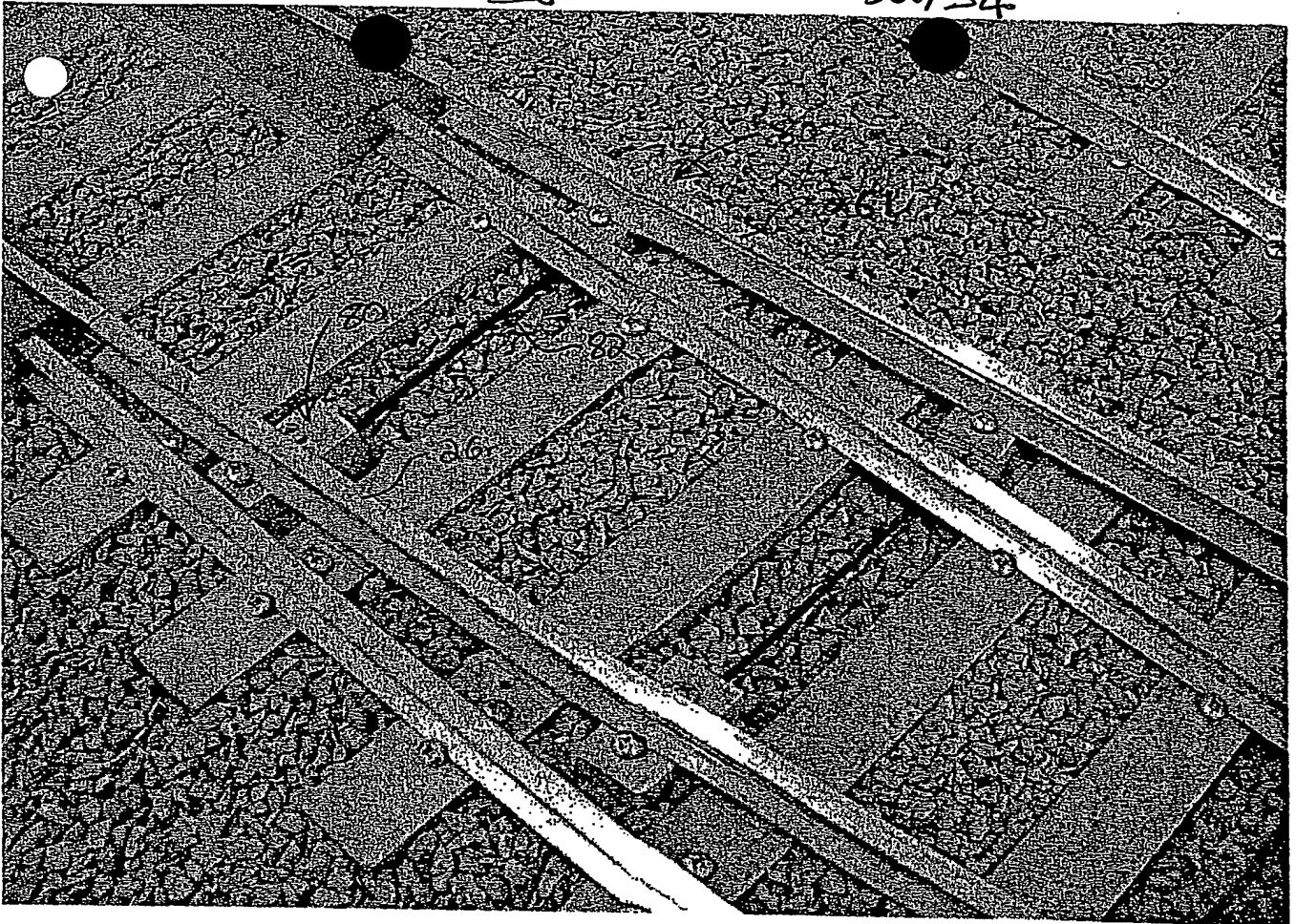
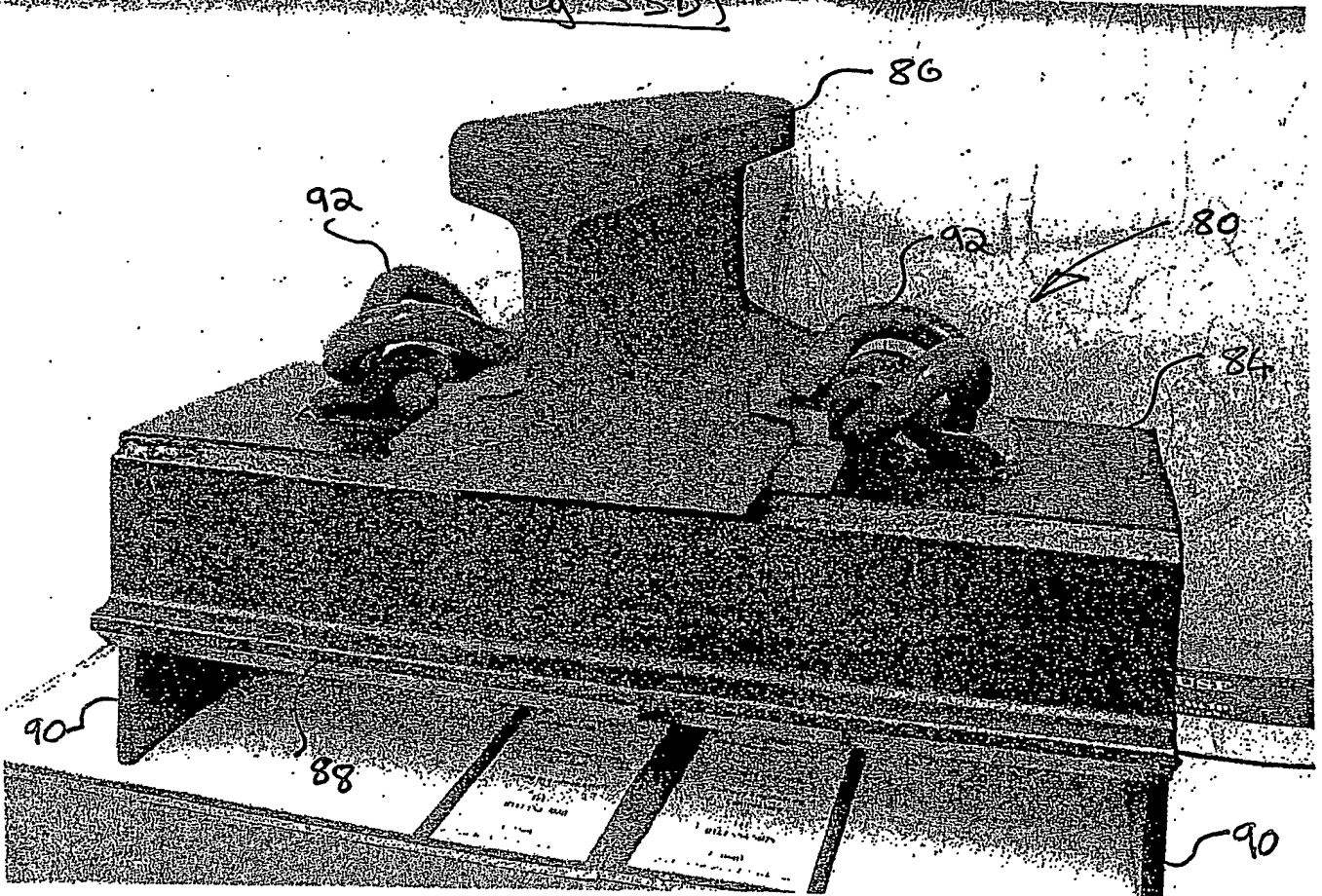


Fig 33b)



This is a high-contrast, black and white photograph of a textured surface, possibly a wall or ceiling. The image shows a grid-like pattern of rectangular panels, likely made of stone or concrete, separated by dark lines. The surface is heavily textured with a mottled, irregular pattern. A large, dark, irregular shape, possibly a shadow or a hole, is visible in the center of the image. Handwritten numbers are present: '60' in the upper left and '40' in the lower right. The image is heavily degraded with noise and artifacts, including a large, dark, irregular shape in the center.

Fig 35a)

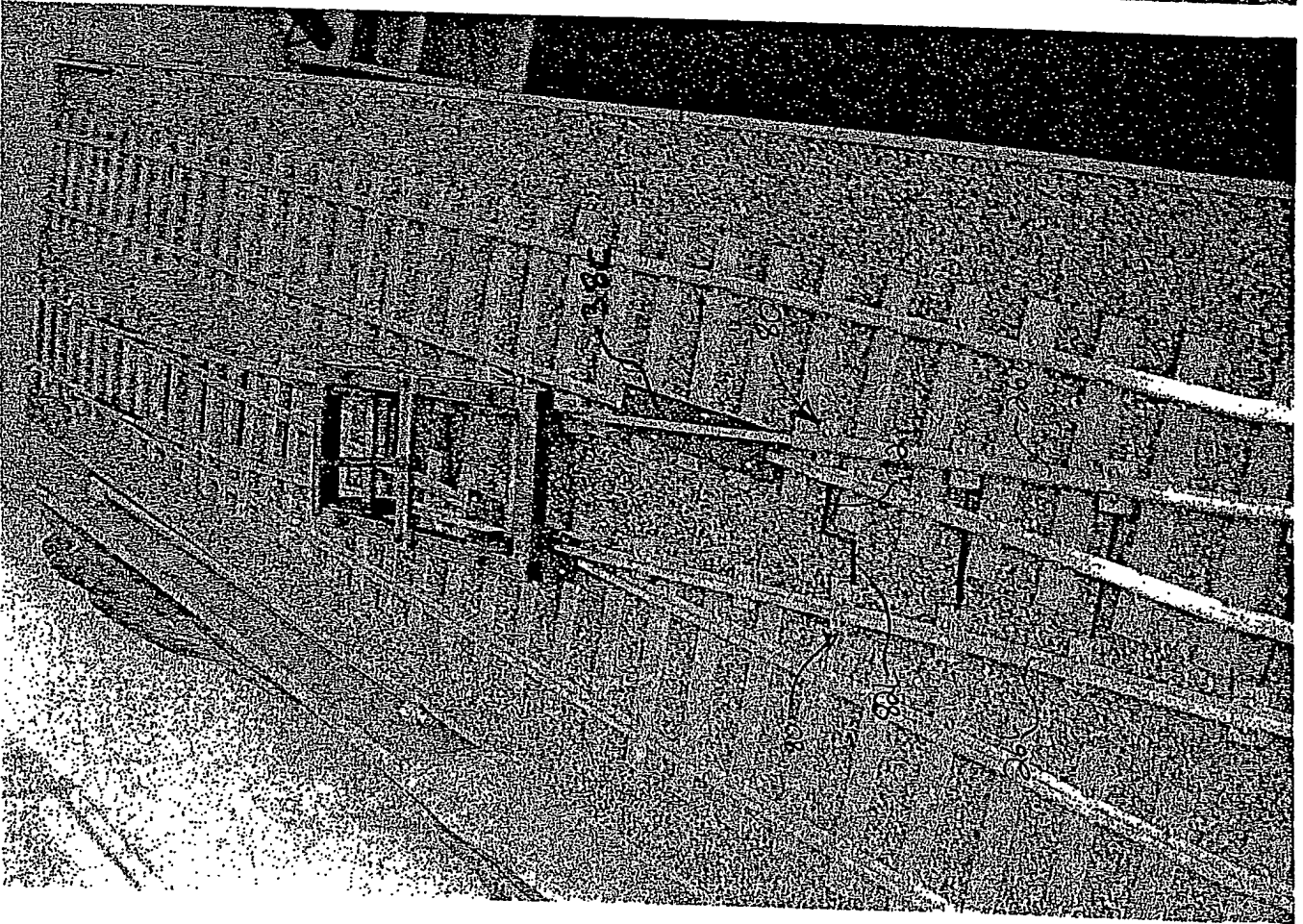
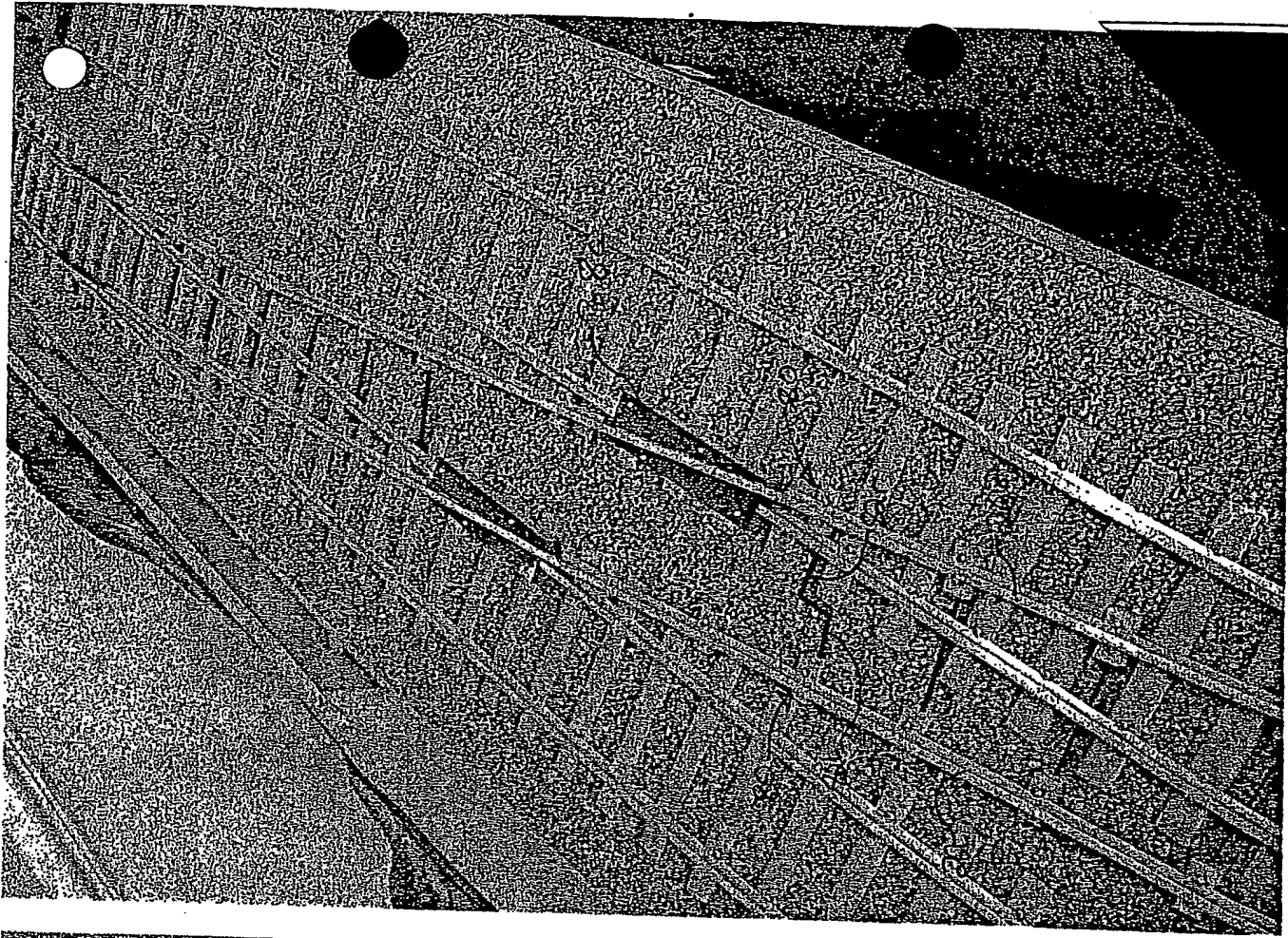


Fig 35b)



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